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VIEWS, NEWS AND INTERVIEWS.

Frederick Gorden Rew, the student who disappeared from Cornell University on October 2, 1894, and was supposed to have met with foul play, has been heard from. Last week his father received a letter from him, dated in India, saying that he was well and homeward bound. His reason for leaving college was that he found that his knowledge of French and German was limited, and he was confident that he would be unable to keep up with his class, and rather than fail he believed it would be better to go among the people and learn the language. After leaving Cornell he went to New York, engaging passage on a cattle ship and working his way to Bordeaux, France. At this place he secured employment with an electric firm that was about to erect an electric plant in Central America. He sailed from Honduras in the early part of 1895, visiting Jamaica, Martinique and Cuba, and then returned to France, where he contracted to look after the electric machinery of a tramp trading ship bound for the East Indies. His knowledge of mathematics, physics and Latin has kept him employed and enabled him to see much of the world.

The *Wall Street Journal* says that Russell Sage stopped a crowded "L" train so that the ticket of a forgetful friend might be put in the box. "I would have treated you to the ride," said Mr. Sage, "but it wouldn't be fair to the stockholders."

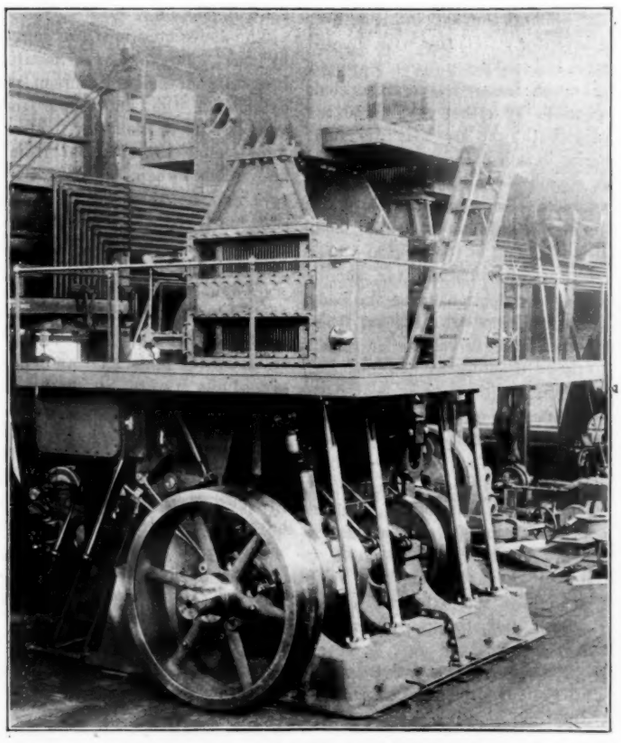
At the recent meeting of the Association of Representatives of German Electric Supply Stations in Hamburg, it was stated that the gratuitous replacement of incandescent lamps by central stations, as recommended by the association in their report on the glow-lamp question in Germany, has been introduced in several towns, and has given every satisfaction.

It is reported that all the street railways of Monterey, Mexico, have been bought up by a local capitalist, who will equip them with electricity and give the city what, it is said, will be the first electric roads in Mexico.

Seyyid Hamed bin Thwain, the Sultan of Zanzibar, who died last week, was among the most enlightened of Oriental monarchs. He introduced electric lights into Zanzibar and kept the streets of the city clean.

A London gunsmith offers for sale cartridges tested by the Roentgen rays to show that they have been carefully loaded.

The motormen on trolley cars between Jamaica and East New York have a simple and effective scheme to force stubborn drivers to pull out of their way, says a daily paper. The motormen run their cars up close behind the obstructing vehicle, keeping full power on and using the brakes to keep down speed. The horses attached to the obstructing vehicles receive a shock when they come in contact with the tracks. Now the farmers, when they hear the sound of a trolley gong, get out of the way in a hurry.



McIntosh & Seymour 2,150-Horse-Power Four-Cylinder Triple-Expansion Engine, Installed at the Amoskeag Mills.

Traffic will soon begin on the new electric line of the Cleveland, Painesville & Eastern Railway Company, running from Cleveland, Ohio, to Painesville, through Collamer, Euclid, Wickliffe, Rush Road, Willoughby, Reynolds, Mentor and Heisley. The company will operate about 30 miles of road.

There is a scheme on foot to furnish electric power to the city of Mexico from peat beds nine miles distant, owned by Boston interests.

A Novel Engine Installation for Mill Work.

The installation of a four-cylinder triple-expansion engine of 2,150 horse-power might not ordinarily occasion comment in connection with a manufacturing establishment of the magnitude of the Amoskeag mills at Manchester, N. H., but an engine of this power which, in order to meet the requirements for which it is designed, has a speed of 232 revolutions per minute, does involve engineering features in design and construction removed from ordinary practice.

The new engine is at what is known as the Jefferson mill of the Amoskeag corporation, and the accompanying illustration will afford an excellent idea of its general features. It is of the vertical type, with the high and intermediate cylinders placed over and tandem with the two low-pressure cylinders, their diameters being, respectively, 22½ inches, 36 inches and two 40 inches; the stroke is 22 inches. At 160 pounds initial steam pressure, under which it is designed to operate, the nominal rate of the engine is 2,150 and maximum rate 2,800 horse-power.

The engine is coupled direct to the main shaft and used as an auxiliary to the water power by which the mill is operated. The speed of this shaft being 232 revolutions, has necessitated the designing of the engine to run at the same speed.

The usual features of the McIntosh & Seymour manufacture are embodied in this engine, although differing somewhat from ordinary practice. The gridiron valves are special for this application, as is also the valve gear operating them. The receivers, of special form, having heating coils of copper containing live steam at boiler pressure, are placed between the high and intermediate cylinders and between the latter and the two low-pressure cylinders. The crank shaft is a nickel-steel forging with a three-inch hole bored through its axis, also through the axis of the pins; the piston rods are also of nickel steel, solid with the cross-head; the connecting rods, of the marine type, have holes bored through them lengthwise to reduce their weight; the pistons are

also of marine type, of steel, and cone shaped; the specifications for the material were intended for the very highest grades for their purposes, and the satisfactory duty of the engine demonstrates how successful were the design, material and workmanship.

Messrs. McIntosh, Seymour & Company, of Auburn, N. Y., may justly feel complimented in this installation, not alone from the fact that the order was received by them after a thorough examination of their designs, facilities, etc., by Capt. Charles H. Manning, superintendent of the Amoskeag corporation, than whom there is no higher authority in mill engineering, but also from the performance of the engine in duty and its smoothness of operation under the severe conditions made necessary in this application of power. In view of the fact that these manufacturers are extending their field of operations to include large units of power for manufacturing purposes, the results of this installation can not be otherwise than of decided benefit to them. The added fact that recent installations for electric service are approaching the types and conditions which have made the generation of power among mills a standard for economy, must place these manufacturers in the foremost line among those who are preparing to meet the changed conditions of generating electricity.

PERSONAL.

Mr. W. C. Dart, of the Rhode Island Tool Company, Providence, R. I., visited New York city last week.

Mr. J. F. Barry, manager of the Columbus Central Railway, of Columbus, Ohio, was a visitor to New York city last week.

Mr. Charles F. Cutler, president of the New York Telephone Company, returned from a two months' European vacation last Sunday on "La Bourgogne."

Mr. Patrick B. Delany, of South Orange, N. J., has received the Elliott-Cresson gold medal from the Franklin Institute, of Philadelphia, for his system of high-speed telegraphy.

At a recent meeting of the directors of the Adams, Mass., Power Company, Charles A. Howland resigned as president and was succeeded by Robert Mannesmann, of the Mannesmann Tube Company.

ELECTRIC LIGHT FLASHES.

The city of Cameron, Mo., is talking of constructing an electric light and waterworks system.

Work is about to be commenced on an electric light plant at Sidney, N. Y., to supply the town with street lighting and for commercial service.

During a recent severe storm a 1,600-light dynamo in the electric station at La Grange, Ill., was almost completely demolished. Service was temporarily interrupted.

An Electric Light Bath.

[*From the Philadelphia Item.*]

An electric light bath is now proposed to take the place of the steam room of the Turkish and Russian bath establishments, and if the hopes of the inventor are realized, one may be able to indulge in the delights and benefits of a Turkish bath without suffering the discomforts of the suffocating department where one feels himself being cooked absolutely, in order to induce an excessive perspiration.

The inventor of the electric bath is John Harvey Kellogg, of Battle Creek, Mich., who is negotiating to put one of them in the principal Turkish bath establishment of this city.

The invention consists of a cabinet lined within on all sides with large mirrors. Electric incandescent lamps are arranged about the inner walls in great number, and in such manner that their combined light and heat will be reflected by the mirrors in the center of the cabinet. A movable couch, to support the body of the bather in a reclining position, is arranged in the middle of the cabinet. This couch is provided with a glass top on which the bather rests, and a mirror chamber beneath the top. Incandescent lights are provided in this chamber so that their heat and light are reflected up through the glass top of the couch to the body of the bather. The inventor claims that with this apparatus induced perspiration is caused at a much lower temperature than is possible by either a Turkish or Russian bath, and also that it is much superior to said baths in the stimulation of protoplasmic activity and more powerful to promote the action of the skin and eliminate carbonic acid. Substantially all of the light and heat of the lamps is utilized, for, should some of the reflections miss the body on first radiation or reflection, they would continue to radiate or reflect until they ultimately reached the body. The action of this radiant heat bath does not depend upon the heat which is transmitted directly by the air, as is evidenced by the fact that the entrance curtain at the front of the cabinet need not be closed air-tight, and that an ample ventilation may be carried on during the bath, and yet the heat will be sufficient to materially raise the blood heat and external heat of the person and stimulate cutaneous activity.

By a series of exhaustive experiments, the inventor has ascertained that the time required to induce perspiration with this apparatus is less than four minutes, on the average, with the temperature in the cabinet about 80 degrees Fahrenheit. In a Turkish bath the temperature required to induce perspiration is nearly 100 degrees Fahrenheit, and the time about five minutes and a half. With the Russian bath the temperature was about the same as the Turkish, but the time required to induce perspiration is almost seven minutes. He also discovered that the internal and surface temperature of the bather at the time perspiration began was about one degree higher when using this apparatus than when using the Turkish or Russian bath. As to the elimination of carbonic acid, careful measurements showed that up to five per cent could be obtained by the use of this apparatus, while with the Turkish bath the highest percentage was 4.07, and with the Russian bath 3.96. To sum up these experiments, this apparatus is a much more powerful agent than either the Turkish or Russian bath for stimulating the activity of the skin and in eliminating carbonic acid.

A very similar contrivance, manufactured by William G. Reuter & Company, of Cincinnati, was illustrated and described in the ELECTRICAL REVIEW for June 18, 1892, page 213. In this device polished nickel plates were used as reflectors. A physician, who examined this bath, reported that the temperature of the patient would rise in 10 minutes to 148 degrees.—ED. ELECTRICAL REVIEW.

X Rays and Material Particles.

TO THE EDITOR OF ELECTRICAL REVIEW:

In connection with Mr. Tesla's theories as to the material nature of X rays, it might be asked why the rays or streams of particles are completely stopped by a fluorescent screen? Are they completely transformed into fluorescence by the tungstate of calcium?

The above questions are suggested by the following experiments: A tungstate of calcium screen placed outside of the fluorscopic screen, and close up to the latter, causes the fluorescence to disappear from the fluorscopic screen, showing that the rays can not penetrate one screen sufficiently to act on another. A fluorescent screen placed in a photographic plate-holder, with the tungstate of calcium side away from the dry plate, absorbs the rays almost completely, so as to leave hardly any traces on the plate after an exposure, say, of one minute, while the object placed on the plate and extending beyond the screen shows perfectly clear. The third point to be demonstrated is, should not the stream of particles passing through a hand have the same effect on the interior as on the exterior of the hand?

In fact, the outside of the hand exposed to the direct action of the rays shows the sunburn effect.

Yours truly,

G. A. FREI.

Boston, August 29.

New Orleans Traction Company.

The New Orleans Traction Company's earnings for the month of July show a decrease in gross of $3,972, but a saving of $4,831 in operating expenses brings the net receipts $849 ahead of the same month a year ago. This decrease in operating expenses is due to the fact that about 40 cars less are running than formerly. The amount of the net earnings for the month was $41,474.

There are about 450 miles of street railway in the State of Michigan, operating 1,100 cars and employing 5,000 men.

TELEPHONE NEWS AND PROGRESS.

The telephone system at Peoria, Ill., was recently knocked out by a severe lightning storm.

The Bell Telephone Company, of Philadelphia, has arranged to erect four new exchanges made necessary by the growth of its business.

Both the party line and measured service systems inaugurated by many of the Bell licensee companies during the past year or so are reported to be highly successful in their workings, both to subscribers and the companies.

The South Bend, Ind., Telephone Company has been connecting its subscribers with various political meetings in the vicinity of South Bend, and several speeches have been successfully transmitted. The apparatus used by this company is made by the Stromburg-Carlson Telephone Manufacturing Company.

The newspapers and brokers of Boston are using at the present time upwards of 25 leased wires of the American Telephone and Telegraph Company to New York city, which are connected with Morse instruments, and they pay a rental of at least $4,000 per annum for each wire. The Western Union formerly supplied the greater portion of this demand.

The instrument statement of the American Bell Telephone Company for the month ended August 20 is as follows:

	1896	1895	1894	1893
Gross output,	9,675	11,009	5,689	4,161
Returned,	7,850	8,730	6,537	6,596
Net output,	1,825	2,279	def. 848	2,435
Since December 20:				
Gross output,	136 353	109,905	53,141	63,627
Returned,	61,517	55,851	46,980	39,348
Net output,	74,836	54,054	6,164	24,279
Total outstanding,	751,372	636,560	572,678	581,869

The new England Telephone and Telegraph Company will open an exchange in South Boston on October 1. South Boston business at present is conducted from the Boston and Tremont exchanges. There are now about 400 subscribers in South Boston, and with the introduction of separate exchange this number will be increased, in the opinion of telephone officials, by at least 100.

The issue of the Cincinnati Bell Telephone directory for September, 1896, is up to its usual standard of excellence. In the front part of the book, printed on pink pages, is a list of the fire-alarm signal boxes, followed by this excellent advice: "Notify the telephone exchange instantly of a fire in your neighborhood, giving the operator, as nearly as possible, the nearest street crossing. Stay at your telephone until you get a response 'All right.' This company has constructed a copper metallic circuit trunk line direct from each of its exchanges to the fire tower. The quickest and most reliable way to report the location of a fire is by telephone."

ASSOCIATION OF POLICE AND FIRE TELEGRAPH SUPERINTENDENTS.

MESSRS. MASON, FOLEY AND BRENNAN HOLD A "CONVENTION"—THE COMMITTEE ON ARRANGEMENTS DISARRANGES THINGS — MR. MASON PROTESTS — MESSRS. FOLEY AND BRENNAN SEND OUT A CIRCULAR—SO DOES MR. MASON — ARE THREE HEADS BETTER THAN ONE?—THE FIRST MEETING WILL BE HELD ON SEPTEMBER 15, IN BROOKLYN.

Mr. F. C. Mason, superintendent of telegraph of the Brooklyn, N. Y., Police Department, is well known among electrical men, and consequently has had an opportunity of observing the benefits of national organization in the electric lighting and electric railway fields. A few months ago Mr. Mason set to work to sound the feelings of the superintendents of fire-alarm and police telegraph bureaus throughout the country on the question of organizing a national association which would be a benefit and a pleasure to themselves.

The responses which Mr. Mason received to his suggestion were very flattering and encouraging. Mr. Mason began to feel that as a pioneer organizer he was a large-sized success.

In the generosity of his heart, and in view of the coming consolidation of Brooklyn and other districts and New York city, Mr. Mason became possessed of a truly altruistic Greater New York spirit, and invited the superintendents of telegraph of New York and Jersey City to co-operate with him in the completion of arrangements for the first meeting of the association.

Mr. M. R. Brennan is superintendent of police telegraph of New York city; Mr. Wm. H. Foley is superintendent of police telegraph of Jersey City. Mr. Mason conferred with Messrs. Brennan and Foley, and finally invited them to meet at his office at police headquarters, in Brooklyn, on August 22 to form a Committee of Arrangements and complete the plans for the first meeting, which was to be held at the Hotel Clarendon, in Brooklyn, on September 15.

Messrs. Brennan and Foley crossed the big bridge and landed together at Mr. Mason's office in Brooklyn at the appointed hour.

"Good morning, good morning, gentlemen," remarked Mr. Mason, beamingly.

"Good morning, Mason," said Mr. Brennan. "I think, Foley, we'd better proceed at once to the formation of a Committee on Arrangements."

"That's right," observed Foley; "let's do it."

"Well," said Brennan, "the first thing now is to appoint ourselves the committee. Well, that's finished. Now, we have to have a chairman. Who'll be chairman, Foley?"

Mr. Mason got all ready.

"I move that Mr. Brennan be appointed chairman," said Foley.

"Why, gentlemen, I—er—um," observed Mr. Mason.

"Well, of course," said Brennan, "I'll vote for myself, and that makes two to one, so I'm chairman. Now for a secretary."

"But, gentlemen, I protest, I pup—pup—, I p—."

"That's all right, Mason. Foley, you'd make a good secretary."

"Secondthemotion," said Foley.

"Well, Foley's secretary. Now, Mason here has devoted some time to this matter, and maybe he's spent a little money on the thing. Guess we'll make him treasurer. Eh, Foley?"

"Sure," said Foley.

"See here, I object to this high-handed sort of procedure. I don't like it," remarked Mr. Mason, warmly.

"That's all right, Mason," said Chairman Brennan. "Now, it's a little late to form such an association this year, isn't it, Foley? Let's postpone this thing indefinitely and stand the expenses share and share alike up to date. What d'ye say, Foley?"

"That goes," was Foley's sentiment.

"All-right. Settled. Committee's-adjourned-subject-to-call-of-chairman. By-bye, Mason," and Brennan started out.

"Bye," said Foley, and he went with Brennan.

Mr. Mason had risen to his feet in angry protest. He now sank into his office chair and gasped out, "Well, I'll be ——! Here, you fellows, come back!" The cry was lost. Then Mr. Mason philosophized and finally laughed and—laughed.

Brennan and Foley meantime were hustling across the big bridge. Arriving at New York police headquarters, in Mulberry street, they set to work on a circular letter which was promptly printed.

On August 24 a copy of the following was sent to the superintendents of fire and police telegraph in all the principal cities:

Superintendent of Telegraph.

Dear Sir: The Committee of Arrangements of the municipal police and fire telegraph superintendents met at the Municipal Building, Brooklyn, N. Y., August 22, 1896. Present, F. C. Mason, of Brooklyn; W. H. Foley, of Jersey City, and M. R. Brennan, of New York. The committee organized by the election of M. R. Brennan, chairman; W. H. Foley, secretary; F. C. Mason, treasurer.

The following preamble and resolution, presented by the chairman, were adopted:

Whereas, Owing to the lateness of the season, it is deemed inexpedient at this time to form an organization of municipal police and fire telegraph superintendents, arrangements for the formation of such an association should be begun not later than the month of June, so as to allow sufficient time to properly organize; therefore,

Resolved, That further action in the matter be deferred indefinitely, and that any expense incurred by Mr. Mason in connection therewith up to the present time, be borne by the members of this committee, equal parts, and, further, that notice of this action be sent to the several municipal police and fire telegraph superintendents throughout the United States by the chairman and secretary of this committee.

The committee then adjourned, subject to the call of the chairman thereof. Very respectfully,

M. R. BRENNAN,
Supt. of Police Telegraph, N. Y. city,
Chairman.

WM. H. FOLEY,
Supt. of Police Telegraph, Jersey City,
Secretary.

New York, August 24.

The ELECTRICAL REVIEW, which was the first paper to announce the proposed formation of this association, also received a circular as above, accompanied by the following typewritten letter:

POLICE DEPARTMENT,
OF THE CITY OF NEW YORK,
300 Mulberry Street.

TO THE EDITOR OF ELECTRICAL REVIEW:

I send you herewith copy of circular letter sent to superintendents of fire and police telegraph, containing proceedings of Committee of Arrangements at meeting held at Municipal Building, Brooklyn, Saturday last. Will you kindly publish same in your next issue and oblige,

Very truly yours,
M. R. BRENNAN.

New York, August 25.

Mr. Mason isn't slow, if he does live in Brooklyn, provided he has a fighting chance. He promptly discovered that the circular printed above was to be sent out, and at once prepared the following, which he mailed the same day to all the fire and police telegraph superintendents:

Dear Sir: Thinking that three heads were better than one in the final work of completing arrangements for the first meeting of our proposed Association of Police and Fire Telegraph Superintendents, I invited the two superintendents of telegraph of our sister cities to confer with me on final arrangements. Having previously assured me that they were heartily in favor of the plans, you can judge of my surprise when, immediately upon meeting me, they elected themselves chairman and secretary of the Committee of Arrangements, and passed a resolution postponing the matter indefinitely; and, after criticising severely all my previous suggestions and letters, decided to adjourn—all of which was done under emphatic protest from me. I immediately notified these gentlemen that I would have nothing to do with their self-elected officers, as I did not believe it expressed the desire of the many superintendents who had favored me with encouragement and valuable suggestions (a large majority having expressed themselves as desiring the meeting in September).

Believing that nothing will be gained, and much valuable time lost, by postponement until June, '97, I propose, with your support and encouragement, to proceed as originally suggested, and invite you to meet me at Clarendon Hotel, Room 16, Brooklyn, N. Y., on September 15, at 10 A. M., for consultation and formation of our association, temporary and permanent organization, and officers thereof to be elected by those present—no self-elected officers. The gentlemen referred to gave me no reason for their apparent desire to kill the association before its birth, other than apparent jealousy.

Kindly notify me before September 5 if you will be present. The original plans of entertainment will be followed. I can assure you that you may expect a good time. After the work and no little expense I have been to in this matter, I can not but think that you will stand by me in my present embarrassment. My only desire is to see the ship successfully launched. It's bound to be a success, other notices to the contrary notwithstanding. Yours very truly,

F. C. MASON,
Supt. Police Telegraph, Brooklyn.

Brooklyn, August 24.

The replies to Mr. Mason's circular began to come in on August 26 and have been continuing to arrive ever since. A reporter for the ELECTRICAL REVIEW asked Mr. Mason whether or not the meeting would be held as originally planned.

"Why, certainly it will," said Mr. Mason. "I have had a very large number of replies to my circular letter of August 24. Every letter is in favor of my going ahead, and the writer of each letter promises to meet me at the Hotel Clarendon, in Brooklyn, at 10 o'clock in the morning on September 15. The meeting is certain to be a success."

Certain people are now trying to satisfy themselves as to the motive which inspired the peculiar and rapid procedure of Messrs. Brennan and Foley. Some say that New York and Jersey City were jealous of Brooklyn in being selected as the first meeting place of the association. Others say that the heat of the presidential campaign affected Messrs. Brennan and Foley so that they were impelled to practice politics a little on an occasion where they were admitted to a convention only by courtesy.

The Citizens' Light and Power Company, of Rochester, N. Y.

On September 26, 1893, the electric plant of the Citizens' Light and Power Company went into practical operation at Rochester, N. Y. The opening was marked by the operating of two Westinghouse alternating generators of a new type, which worked perfectly. The peculiarity of this combination is that a direct current of 550 volts is taken from one end of the armature and an alternating current of about 385 volts is taken from the opposite end. In other words, the entire output of the generator may be utilized for direct-current work, the entire output used for alternating-current lighting and power purposes, or it may be divided between two classes of work in such proportions as may be desired. The advantage of such a machine in a plant of moderate size is obvious even to the layman. It means that, without the possession of a multiplication of costly machinery and the expense and trouble of continually stopping and starting various parts of it, the Citizens' Light and Power Company can do work on the following lines: Direct-current motor work, incandescent lighting by alternating current, arc lighting and street railway work. The plant at present has a capacity of 8,000 incandescent lights, 400 arc lights, and current for 525 horse-power in motors. The plant contains the following machinery: Five Westinghouse alternating generators of the newest type, five Stern boilers of 200 horse-power each, two water-wheels of 500 horse-power each, one Woodbury engine of 600 horse-power, one Corliss engine of 600 horse-power, rope drive, speed 7,000 feet per minute; 14 step-down converters, alternating current of 385 to 2,000 volts. Mr. J. A. Almstead is superintendent of this plant.

ELECTRICITY DIRECT FROM CARBON.

ABSTRACT OF A PAPER READ BEFORE THE BERLIN ELEKTROTECHNISCHER VEREIN, BY DR. ALFRED COEHN.

The problem of the direct production of electricity from carbon would find its simplest solution if we could succeed in dissolving carbon in a fluid, just as we do metals. This question is formulated thus by the theory of electrolysis: Can carbon form ions?

In attempting to find an answer to this question, I started from an observation made by Bartoli and Papasogli, that when dilute sulphuric acid was electrolyzed between carbon electrodes, the carbon anode takes part in the electrolytic processes, in such a way that, besides oxygen, both carbonic oxide and carbonic acid make their appearance at the anode. I commenced my experiments by varying the important factors; viz., concentration, temperature and current density, in order to discover whether it was possible to obtain the products of combustion without admixture of oxygen on the anode. I have not succeeded in obtaining carbonic acid or carbonic oxide alone, but a mixture of the two, containing only one per cent of oxygen. In this mixture about 70 per cent was carbonic acid and 30 per cent carbonic oxide.

In these experiments it was observed that at low temperatures a disintegration of the carbon anode took place, small particles of carbon being seen suspended in the acid. At higher temperatures, on the contrary, no such disintegration of the carbon took place, but a distinct coloration of the acid was produced, at first yellow, then later dark red and red-brown. If this is a solution of the carbon brought about by the current, the carbon is presumably contained in it, in the form of ions; *i. e.*, in a form capable of being influenced by the directing power of the current. Such a solution must be capable of giving up carbon to the cathode, since carbon does not decompose water. (A series of platinum plates coated with carbon was shown, and a dish, such as is used by Classen for quantitative electrolytic analysis, was shown coated inside with a dense layer of carbon.) The solution and precipitation could readily be obtained with different kinds of coal as anode. Ordinary coal ground smooth and arc lamp carbons were found specially suitable; the experiment also succeeded with coke.

That the precipitate was really carbon, and not metal derived from impurities in the coal, was shown by treatment with acids. It was not attacked by hydrochloric acid; in hot nitric acid traces were dissolved, as in the calorimetric test for carbon in steel. In the flame even the densest precipitates completely disappeared immediately. Finally, a direct proof was obtained by oxidizing the precipitated carbon by chromic acid, and absorbing the resulting carbonic acid in alkali. A number of analyses were made, and these always showed, in addition to carbon, a little hydrogen. The residue—reckoned as oxygen—was sufficient to convert the hydrogen found into water. Either, therefore, in addition to the carbon, a solid, conducting carbohydrate was separated, or some kind of crystalline water which adhered strongly to the carbon was produced. The presence of water in the precipitate is indicated by its behavior with concentrated sulphuric acid. If the acid is dropped on the precipitate it is immediately loosened and blackened, reminding one of the behavior of sulphuric acid with a carbohydrate.

It was now of interest to attempt to construct an element whose soluble electrode consisted of carbon. The only question now was to place a more electro-negative element opposite the carbon. The peroxides stand still nearer even than carbon to the negative end of the potential series. Lead peroxide was used in the practical form of a charged accumulator plate. If this is placed opposite a carbon in sulphuric acid of the proper concentration, temperature, etc., an element is formed of which carbon is the soluble electrode. The element supplies a strong and constant current. Through an external resistance of 100 ohms it shows an electro-motive force of 1.93 volts.

There arises here the question whether any share in the production of the current is due to the reaction on the carbon, and if so, what share? Platinum also, when placed opposite a peroxide plate under the same conditions, shows a current in the same direction as the carbon; but it never comes to a visible development of oxygen. As soon as the platinum is charged with oxygen the current becomes exceedingly small. If the carbon was an insoluble electrode it would behave in the same way; but this is not the case. The current lasts till the accumulator plate is discharged. A second charged peroxide plate may then be substituted, and the current is again produced as strong as before.

The results of my investigation may be summarized as follows:

1. It is possible by electrolysis to produce a solution of carbon.

2. From such a solution carbon may be separated as a cation.

3. An element may be formed of which carbon is the soluble electrode.

The "Review" is the Best Journal for Street Railway Men.

[*From The Motorman and Conductor, Detroit.*]

For electrical news of all kinds we would recommend the ELECTRICAL REVIEW, of 41 Park Row, New York city. It is the best journal for information to electricians, street railway men and companies that is published in the United States.

What is Infusible in the Electric Arc?

TO THE EDITOR OF ELECTRICAL REVIEW:

What is the best non-conducting substance that is practically infusible in the arc light? READER.

August 20.

The Electric Railway in Fairmount Park, Philadelphia.

The Fairmount Park Transportation Company was organized under the laws of the State of New Jersey for the purpose of constructing and operating an electric railroad in Fairmount Park, Philadelphia, until July 24, 1936. It owns the license granted to Wm. Wharton, Jr., to whom we are indebted for the information contained in this article, says the *Railroad Gazette*. The capital stock of the company is $2,000,000, the par value of the shares of which is $50.

The route in the West Park begins at the intersection of Belmont and Elm avenues; thence with double track skirting the boundary of the Park, via George's Hill, to Belmont Summit; from this point a loop extends along the wooded slopes and hillsides near the Schuylkill River to Chamounix and to the lakes; thence, closely following the northern boundary of the Park, it joins the double track at Belmont Summit. This line is about seven miles long, single-track measurement. There is also a branch railroad with double track beginning at Ridge Avenue, Thirty-third street and Dauphin street, passing Strawberry Mansion, crossing the Schuylkill on a steel bridge 90 feet high and connecting with the tracks in the West Park. The road connects at its termini, in the West Park and East Park, respectively, with all the city lines running to the park. The territory traversed is beautiful and romantic.

The power house and the car house which are being erected on the line of the Philadelphia & Reading Railroad, on the westerly bank of the Schuylkill, near Columbia bridge, are well under way. They are of modern steel construction filled in with brick walls, and have a large capacity. The ground needed for the power house, car house, passenger stations, etc., was provided by the Park Commissioners without rent or other charge. The steam engines, boilers, electric generators and all other machinery and appliances are of the most approved types.

The fare for the round trip in the West Park and on the branch line, from the East Park over the bridge to its junction with the track in the West Park, will each be five cents. From May to November, both inclusive, the cars are obliged to be run by the terms of the ordinance, but there is no obligation to run any cars during the other five months.

The tracks will be laid with steel T-rail, 90 pounds per yard. No grade crossings will exist at any roadway, bridle path or foot path; the tracks over the bridge will be entirely separated from the carriage and foot travel, and all dangerous places will be guarded by fences. Sixty eight-wheeled cars will be provided at the outset, each having a seating capacity for 100 persons. Four 1,000 motors will be placed on each motor car, and will be of sufficient power to enable it to draw a trailing car of equal seating capacity.

The whole of the line has been graded, for a part of the distance there was very heavy rock cutting; about one-half of the track has been laid; a number of the bridges have been built, and the piers and abutments for the large bridge over the Schuylkill River are under way. The J. G. Brill Company are building the 60 cars, which are almost ready for delivery; the General Electric Company are furnishing the generators, motors and other electrical equipment; Robert Wetherill & Company are making the engines and boilers; William Wharton, Jr., & Company, Incorporated, are providing all the materials and labor for the tracks, and Pepper & Register are furnishing all the labor and materials for the electrical line work. George S. Gandy is president and E. H. Hults is secretary and treasurer of the company. The directors are G. S. Gandy, James Rawles, A. L. Register, F. S. Dickson, J. H. W. Chestnut and J. W. Henderson, of Philadelphia, and A. R. Kuser, of Trenton.

Steam vs. Trolley.

Counsel for the New England Railroad Company has filed in the Superior Court an amended complaint against the Central Railway and Electric Company, of New Britain, the Newington Tramway Company and the Hartford Street Railway Company, in its suit to restrain these companies from building a trolley road between Hartford, Ct., and New Britain. The original writ was filed in June. In the new complaint the New England road alleges that on March 21, 1896, the Hartford Street Railway Company and the Central Railway and Electric Company, of New Britain, entered into a conspiracy to defraud the New England road of its just rights by building a trolley road to carry freight and passengers between New Britain and Hartford. The complaint further alleges that, in furtherance of this conspiracy, 121 shares of the Newington Tramway Company were illegally transferred to four directors of the Hartford Street Railway Company.

What the Trolley Has Done for Cincinnati.

A writer in the Cincinnati *Commercial Tribune*, referring to the street railways of that city, says: "No city in this country has been extended and built up by electric and cable systems as has this. Of course, it is the thing to grumble at the company and demand three-cent fare and unlimited transfers. Of course, it was the popular thing to demand confiscation of the property through refusal to extend franchises and all that sort of thing. But the hard fact remains that the street railways of Cincinnati have made it possible for one-time 'Porkopolis' to blossom into a beautiful residence city, whose teeming population has reclaimed the surrounding wilderness of rugged table lands and carried metropolitan thrift for miles around."

The Shah of Persia Loved the Telegraph Lines.

The late Shah of Persia was generally reputed to be a good deal of a barbarian, but it is said that in reality his instincts ran strongly toward civilization, and he was a staunch promoter of progress throughout his dominion. Some reform or other followed each of his many visits to the civilized countries of Europe. After one trip he introduced the telegraph, and the line between Teheran and India was completed. For a while everything went well, but presently the Shah went off for a prolonged stay in his beloved Paris. In his absence his subjects inaugurated a new form of amusement—the shooting away of the wires and the cutting down of the poles. In many places the line was so badly wrecked as to stop the service. When the Shah returned he passed a decree that the first violation of the order to let the line alone should be severely punished, and at the second offense the offender should be buried to the neck beside the pole molested, and left to die. A traveler, who passed through Persia some time after this mandate had been given, had occasion to follow the road along which the telegraph line was laid. He said that the line was in fine order, and that that fact was an unmistakable proof that the Shah knew well the art of ruling his people. At the foot of nearly every pole was a human head. In some cases only the skull was left, in others the flesh was still clinging to the bones. In some cases the punishment had been carried out only very recently, and some of the offenders were not even dead. The remedy was drastic, but it saved the telegraph line.

X-Ray Pills.

New developments of the X rays are continually taking place, the latest being a system of electric lighting for the interior of the human frame, says London *Lightning*. No dynamo or other elaborate apparatus is required. The machinery consists of a small transparent pill, which, instead of containing aloes and soap, is charged with Roentgen rays. The patient swallows it, and it at once lights up his internal economy and greatly facilitates the investigations of his medical advisers. When the light goes out the transparent capsule simply melts away. It is an American who has invented the Roentgen pill, but it is quite evident that the system is capable of much wider utility than a mere aid to diagnosis. With a supply of these pills in his pocket every man is capable of becoming his own lamp post, and on the darkest of nights may turn himself into an ambulatory light-house, to the advantage of himself and the neighborhood. But a limitation of the dose would become absolutely necessary, because, if a rash person swallowed two or three at a time, a policeman might mistake him for a conflagration, and call out the fire brigade. There is evidently a great future in store for this medicine.

The Clark Pipe-Hanger.

The Buffalo Engineers' Supply Company, Erie County Bank Building, Buffalo, N. Y., are the general sales agents for the Clark pipe-hanger illustrated herewith. This device is of novel design and possesses many advantageous points. It is cheap, durable, neat, and will swing in any direction. It is designed for use on steam, water, gas or oil piping. It is made of strictly high-grade malleable iron, extra strong, and is unbreakable. It permits of expansion in any

FIG. 1.—THE CLARK PIPE-HANGER.

direction and can be extended to any length by means of a hanger bolt, piece of pipe and coupling It can be put up or taken down in an instant. Lag screws are not furnished with these hangers, owing to the various lengths used and the fact that this hanger will clasp any standard lag screw head, bolt or nut, but standard lag screws or hanger bolts with pipe thread at market prices can be supplied if desired.

A Busy Telephone Manufacturing Company.

The Western Telephone Construction Company, Chicago, report that, in spite of the hard times, orders are pouring in to such an extent that, although they are working their factory to its utmost capacity, they can not keep up with them.

The 900-capacity switchboard for La Crosse, Wis., has just been shipped. This board embodies the latest and best inventions and designs of the experts connected with this company, and has been pronounced by those who have seen it to be the finest switchboard in existence.

Orders from Fort Wayne, Ind., and Richmond, Va., telephone companies for increased capacity have been received almost before their original orders were filled.

Among the most recent contracts secured by this company are Carmi, Ill., 100-drop switchboard and telephones; Olney, Ill., 100-drop switchboard and telephones; Globe Telephone Company, Winchester, Ky., 100-subscriber equipment complete; Sandersville and Tennille, Ga., one 50-subscriber and one 40-subscriber equipment complete; Dunning Institute, the Insane Asylum of Cook County, 30-subscriber installation complete; Washington, Iowa, 200 equipment; Fort Kent Telephone Company, Fort Kent, Me., 50-capacity switchboard, and Normal, Ill., 50-drop switchboard and telephones.

The New German Glow Lamp.

This lamp, which has recently been invented in Germany, consists of a "glow plate" connected at each side by a platinum wire and inserted in a glass bulb and the air extracted, as in ordinary glow lamps, says our London namesake. The "glow plate" is manufactured of pure, unpressed and hygroscopic asbestos fibre, cut into strips of about three millimetres thickness and about six centimetres long. Such a strip is, firstly, saturated with a 30 per cent platinum chloride solution, and, secondly, passed through a solution of saturated sal-ammoniac, and is then dried in hot air. Then it is converted into spongy platinum by heating it in a Bunsen burner. Then, after saturating it in a 20 per cent magnesium chloride solution, it is again heated white hot in a Bunsen. This last process is repeated until the filament has received an even cover of magnesium. The melting point of platinum does not affect the usefulness of this filament, as the cover of magnesium protects it. As the lighting capacity of the alkaline earths is about three times as great as that of carbon, it is said to be possible, by using this lamp, to save much current. The manufacture of the lamp is comparatively cheap; that, as the resistance of this glow material is much greater than the resistance of carbon, the lighting surface can be made much greater than in ordinary glow lamps.

KIND WORDS.

LIKES IT.

TO THE EDITOR OF ELECTRICAL REVIEW:

I am a subscriber to your valuable journal and like it very much.

GEO. O. STEVENS.

August 21.

"BRIGHT AND CLEAN."

TO THE EDITOR OF ELECTRICAL REVIEW:

In looking over your ELECTRICAL REVIEW we find it very interesting,

FIG. 2.—PIPING SUSPENDED BEFORE LOCKING CLARK PIPE-HANGER.

and can compliment you for having such a bright and clean paper.

JOHNSON & SMITH.

August 14.

WANTS EVERY LINK IN THE CHAIN OF PROGRESS.

TO THE EDITOR OF ELECTRICAL REVIEW:

My copy of the ELECTRICAL REVIEW for August 19 has not arrived, and I feel as if a link had been dropped from the chain of progress.

Yours, etc.,

F. W. TURNER.

August 24.

A Fearful Trolley Ride.

One hundred and twenty persons had a fearful ride down the Catoctin Mountain grade near Frederick, Md., in a trolley car which was beyond the motorman's control, on August 23. At Mercer's Curve the car jumped the track and went down an embankment, turning over on its side with a crash and finally coming to a stop against a fence. The passengers had a marvelous escape; no one was killed, and but three were seriously injured. All the occupants of the car were more or less bruised and cut, and 30 of them reported some pronounced injury. The car attained a speed of 50 miles an hour. A mile from the summit of the mountain a trestle 400 feet long and 45 feet high, spanning a ravine, was to be crossed. Over the dangerous point the flying car sped, crossing it safely. The car went on at full speed until it struck Mercer's Curve. It jumped the track and ran about 100 yards on the cross ties. This impeded its progress very materially. The wheels ploughed through the ties. It tumbled down an embankment, which fortunately was only about seven feet high. The car went over on its side with a crash and almost stood on its top.

Electric Lighting in Jamaica, L. I.

The application of William M. Scott, a tax-payer of the village of Jamaica, Long Island, for a writ of mandamus to compel the Board of Village Trustees to declare void and to cancel a resolution awarding a $10,000 contract for lighting the streets to the Jamaica Electric Light Company, has been denied by Supreme Court Justice Goodrich. Mr. Scott asserted that when the board voted on the contract, President Twombly did not vote, but merely declared the resolution carried, three trustees having voted for it and two against. He contended that the village charter required Mr. Twombly to vote. Justice Goodrich says the charter provides that the president may vote for or assent to the passage of a resolution, and that President Twombly assented to the contract when he declared the resolution carried.

The Tallest Chimney.

What is said to be the tallest chimney in existence was built for the Metternich Lead Works, in Germany. It is 440 feet in height, 11 feet of which is underground. The foundation is of block stone, and 37 feet square; the rest is of brick, 34 feet in diameter at the base, and tapering to 11½ feet at the top. The tallest chimney previously constructed is that of the St. Rollox Chemical Works, near Glasgow, Scotland, which is 434 feet high.

The September *Scribner's* opens strikingly with a color reproduction of one of four decorative panels by Edwin Howland Blashfield, made for a golden piano owned by Mrs. George W. Childs Drexel. It is a very effective group, representing Music allegorically. Similar colored frontispieces will ornament the October and November issues.

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On careful consideration, it is a wonderful thing that nearly every branch of the electrical industry has made its most remarkable progress during the last three years, which have been chiefly notable as a period of business depression.

The adoption of electric motive power on the Manhattan elevated railways in New York city is foreshadowed in experiments which are about to be tried on the Thirty-fourth street branch of the Third avenue line. It was on this same stretch of track that Stephen D. Field, several years ago, make his experiments with his electric locomotive. This piece of road may yet become historic in the annals of elevated electric traction.

Papa is lighted by electricity, and has been so lighted for the last four years. Whose papa? Why, Papa is a town in Hungary, and an enlightened one at that.

When Nikola Tesla was asked what he considered the most significant word in the English language, he replied, "Nature." This was a natural answer for a man who stands among the few that have very closely approached nature's secrets.

The free-silver candidate for the presidency last week took a ride on the electric railway from Buffalo to Niagara Falls. This road was built by a well known contracting engineer who is an ardent sound-money man. There is a little joke here on somebody.

Considerable interest has lately awakened in the development of long-burning arc lamps. There are several types of this kind of lamp now on the market, and others are promised in time to meet the demands of the Fall trade. The advantages of cleanliness, freedom of danger from sparks and economy in carbons and trimming are important points to the user, and are daily becoming better appreciated.

Electricity has again shown itself to be the friend of the bicyclist. Some genius has made an application of the useful current which is reported to be highly successful in driving away dogs who are prone to snap at a bicyclist's legs. This is accomplished by equipping the rider with a portable battery, a switch and a small incandescent lamp, which is attached to the heel of the shoe like a spur. When the dog is as close to the rider as desirable, the switch is thrown and the light is flashed into the dog's eyes. This scheme is said to put the most vicious dog to instant flight.

Referring to our recent discussion as to whether or not college professors should take out patents, the Elmira, N. Y., *Gazette* says:

The ELECTRICAL REVIEW has been giving much space to a discussion of the very easy question whether college professors should take out patents on discoveries they make.

The common-sense opinion is that the professor, as well as any other man, may secure for himself the rewards of any discovery or invention belonging to him. The professor who discovers or invents has as much right to a patent as the professor who writes a book to a copyright. One action is no more disgraceful than the other. Both are justified by the fact that every man should have the rewards of his own labor.

Distinguished professors who do not take out patents do not make a rule.

THE SITUATION.

When 350 watts make one horse-power, when copper wire sells for five cents a ton, when six inches make one foot, when two feet make one yard, when one watt equals a kilowatt—

Then 53 cents will make one dollar, and the people of the United States will stand as the largest aggregation of dishonest repudiators in the history of the world.

Are you frightened because of the political battle now being waged? You needn't be. The question of honest or dishonest money will seek its own level, and the people of this great and beloved country of ours will speak in no uncertain voice next November.

This is a campaign of intelligence—a thinking, reading, common-sense campaign. The cause of honest currency, the efforts of those patriots who will at any cost preserve their nation's honor, the service done by honest-money campaign documents and the yeoman work of the sound-currency newspapers are bearing fruit each hour. The able oration of the Hon. Bourke Cockran, the masterly and statesmanlike letter of acceptance of Major William McKinley and the able discourse of the Hon. Benjamin Harrison were three telling blows for the right which caused the free-silver dragon to experience those pangs and pains which are the certain prophecies of disaster and defeat.

There is no cause for alarm. To be sure, the present is a time when business caution should be observed, but the manufacturers of this country are far-sighted enough to discern the ultimate outcome of the campaign, and no amount of free-silver talk can stampede them. The electrical manufacturers are preparing to handle an amount of business which will tax their plants to the fullest extent. They are ready to prosecute their trade on a larger scale than ever, firm in the belief that this, the greatest republic since the world began, will preserve its credit before the other nations of the earth, and adhere to those principles laid down by our wise forefathers, which assure to us all the blessings that perfect liberty means.

We exhort each and every one of our readers, irrespective of party politics, to work unceasingly until election day in the cause of honesty, sound money and future prosperity.

Defeat is bitter; annihilation is better—see to it that each honest man does his share toward the utter extinction of the men and the parties who would disgrace us and our country forever.

Roentgen Rays in Ophthalmic Surgery.

[*From the London Lancet.*]

It is not surprising that an effort should be made to utilize these rays for the discovery of foreign bodies in the eye, although the difficulties that present themselves are considerable. It is, of course, exceedingly difficult, if not impossible, to take photographs through the whole thickness of the head, either in the sagittal or transverse direction, and the eye is so deeply ensconced in the orbit, the bony walls of which obstruct the passage of the rays, that the method can only be used with any prospect of success in cases where the opaque object is situated in the fore part of the eye. Still, Dr. Lewkowitsch has shown that with a little ingenuity, and by taking advantage of the rolling movements of the eye, a larger region than might be anticipated can be brought under observation. The number of cases in which this method can be applied is, of course, limited in another way; viz., by the surgical conditions present which are quite peculiar to the eye. When the fragment of metal or other missile is large, the eye is usually irreparably damaged and its removal is imperative; when, on the other hand, the object is very small, it seems to be doubtful whether any indication of its presence could be obtained. The Roentgen rays would seem to be most likely to prove serviceable in the recognition of shot or other moderate-sized fragment of metal or of glass embedded in the anterior portion of the sclerotic or in the vitreous, especially if surrounded by blood. Such cases are extremely difficult, if not impossible, to diagnose by any means which up to the present time are at the disposal of the surgeon. Dr. Lewkowitsch deserves much credit for the ingenuity of the method he has devised for the application of these rays, and especially for the arrangement of the apparatus by which double images can be obtained and the exact position of the foreign body determined.

Telephone Experiments in Brussels.

The Belgian authorities have recently made some interesting experiments with the loud-speaking telephone instrument and electrical fire-alarm appliances of the Single Wire Multiple Telephone Signal Company, of London. In addition to the apparatus to test the adaptability of which the experiments were arranged, a new portable loud-speaking combined telephone and telegraph instrument, specially designed for military purposes in the field during operations, formed a feature of interest, the extreme portability and light weight of the whole apparatus attracting considerable attention. It was proved that Morse signals were quite audible even when several feet of damped twine were interposed in the circuit. London *Lightning* understands that the British military authorities are taking an interest in the instrument, and that a demonstration of its special suitability for military purposes will shortly be given.

The Association of Fire and Police Telegraph Superintendents.

This association, which is to hold its first meeting in Brooklyn, September 15, will be welcomed by Mayor F. W. Wurster and Park Commissioner Timothy L. Woodruff. Other officials of the city have stated that they would be present, including Police Superintendent W. J. McKelvey. The meeting will be held at the Clarendon Hotel, and promises to be largely attended by the superintendents of the different cities.

The Business Situation.

What change occurred in the business situation last week was favorable rather than otherwise. There was no increase in transactions, but people somehow feel that bottom has been reached, and as this idea spreads from one mind to another, it will constitute a force that will make business.

The signs of the times are reflected in the inclination to resume work here and there, says the Boston *News Bureau*. The trading world, that has been living from hand to mouth, finds buyers "nibbling," and this makes jobbers and merchants inclined to increase somewhat their stocks. When the gold now on its way and ordered arrives, money should be more easily obtainable, and with this machinery again in motion, what unfavorable conditions then surround the situation should be more easily rectified.

Kings County Elevated Railroad Fails.

Gen. James Jourdan, president of the company, was appointed receiver of the Kings County Elevated Railroad Company, of Brooklyn, N. Y., on Monday morning of this week. The company operates five and one-half miles of track. The directors assert that this is worth $85,000 a mile, exclusive of franchise. The Board of Assessors of Kings County contend that the property is worth very much more than this. It cost $10,193,728 to build the road and equip it. The company has 145 passenger coaches. It cost over $500,000 a year to maintain and operate the system. Up to 1893 the company was capitalized for $3,250,000, but its capital has been increased until it is now $4,750,000. The road carried about 30,000,000 passengers a year before the introduction of trolley cars in Brooklyn. The success of the trolley, however, reduced this business over 50 per cent. It has been suggested that by the adoption of electric motive power, the operating expenses might be reduced sufficiently to again put the road on its feet.

The report of the Columbus, Ohio, Street Railway Company for the first two weeks in August shows a very gratifying increase in receipts. During the first week the company took in $12,730, an increase of $1,001, and the second week's receipts were $11,798, a gain of $720.

Li Hung Chang and Lord Kelvin.

When Li Hung Chang was in England, Lord Kelvin was presented to him. Li's propensity for asking questions is well illustrated in the following, which is part of a conversation that took place between these great men:

Li commenced by observing: I believe you are the first scientific man in the world; and then he asked how many students in a year passed through his hands.

Lord Kelvin replied that the number was about 200.

Li: How long have you been a Professor of Electricity and Natural Philosophy in the University of Glasgow?

Lord Kelvin: Fifty years.

Li: Among this great number of students, does any of them ever become so great a scientific man as you are?

Lord Kelvin: I think that is for other people to judge, your Excellency. All my students, after leaving college, have become practical men, and they render good service to the people in that way. They do not necessarily devote their attention to the study of science as I do.

Li: Who succeeded you as president of the Royal Society in London?

Lord Kelvin: Sir John Lister, the first surgeon in London.

Typesetting by Telegraph.

The Long-Distance Electric Typograph Company, of St. Louis, has been incorporated with a capital stock of $100,000. Joseph J. Reifgraber, the inventor, holds 991 shares; C. P. Connolly, five shares; Charles Lenz, two, and Jacob Handleman and Julius Friedman, one each.

The electric typograph system is designed to enable a newspaper editor to do not only his own work of writing, but that also of the telegraph operator and typesetter, while the performance of all their duties is facilitated. The editor is to "pound out" a "story" on a typewriter-like machine which is electrically connected with a telegraph wire system. His "story" will be automatically reproduced in every newspaper office in the country connected with his wire, and being furnished with the instruments which compose the electric typograph system. Mr. Reifgraber says no new principle is involved in his invention, which was patented about a month ago. "It is merely a new application of old principles," he says.

ELECTRIC RAILWAY NOTES.

During the coming Fall and Winter the street railway companies of Philadelphia will have to defend 289 damage suits which have been brought against them.

There is the probability of a strike among street railway employés at Sacramento, Cal., owing to a recent increase in the hours of work from 10 to 12 per day.

The Syracuse Rapid Transit Company is now in sole possession of the street railroad system of Syracuse, N. Y. The only obstacle in the way of complete possession was removed on August 26, when Sheriff Austin sold the franchise and rolling stock of the Syracuse Street Railroad Company to the Rapid Transit Company for $350,000. This was the lowest amount that could be received. The sale was made by order of Justice Hiscock, who confirmed the report of Referee George Barrow. Frederick Straus, of New York, representing the Syracuse Rapid Transit Company, was the successful and only bidder.

The Cincinnati Street Railway Company has issued the following circular:

The Cincinnati Street Railway Company has fitted up a number of excursion trolley cars, furnished same in a style of luxury and comfort, and is prepared to run them to any part of the city and its (Ohio) suburbs, as parties may desire. The cars for Summer are open, handsomely upholstered and furnished with comfortable movable seats, for from 15 to 20 persons. Winter cars are closed, with solid, plate-glass, stationary windows, handsomely upholstered and furnished with velvet carpet and comfortable movable chairs.

All parties using these cars and passing Chester Park will be given free admission to the park.

Charge for excursion trolley cars will be $5 for the first hour and $2 for each succeeding hour, or $10 for a morning, afternoon or evening ride (consuming not more than five hours).

Street Railways in Glasgow, Scotland.

[*From London Industries and Iron.*]

The corporation of Glasgow have instituted what is undoubtedly the most exhaustive (and probably expensive) inquiry into the comparative merits of the different standard systems of electric traction ever carried out. Certainly, it would appear, that if Glasgow is ambitious of having the most perfect type of electric street traction at present known, the researches of its officials would appear, but for one fatal defect, to be almost redundantly ample. But, though the delegates seem to have made a thorough exploration of the chief continental centers, and pursued labors which were perhaps not altogether *con amore*, yet, by some unaccountable oversight, they have totally omitted the United States in their purview of contemporary advanced electrical practice. It is quite acknowledged that America is entitled to be considered as the very fountain head in this matter, seeing that American systems have been so largely adopted in Europe, the Thomson-Houston system alone averaging nearly 25 per cent of the total installations. The committee, judging from the liberal way in which the documentary and photographic evidence is presented, seem to have plenty of money at their disposal, and whilst the delegates were about it they might just as well have made an expedition to the United States, where, we are pretty sure, they would pick up more up-to-date and practical knowledge in 24 hours on electrical traction than in the whole course of their continental experiences. The Glasgow corporation, as is now well known, have decided to adopt the trolley. We do not suppose they are far wrong, as the conduit and stud, whether button or rail, have not yet been shown to be free from very serious disadvantages.

Kind Words for a Member of our Staff.

The following article from the pen of Mr. Leander F. Morris in *Profitable Advertising*, of Boston, is a well merited compliment to a hard-working official of the ELECTRICAL REVIEW:

"Did you notice that boy as he went out?" said Frank Jones, the ex-railroad president, brewer and hotel owner, as I sat in his reception room in Boston nearly four years ago. "Well," he continued in his bluff way, "he was sent by one of the daily papers to ask my views on several projects for rapid transit, and I said that I did not care to talk on the subject, but he had hardly spoken before his introduction of the subject and his address caught my attention, and I am ashamed to say he got half an hour of my time, and gained all his points. I guess it's all right, though, for a fellow with his magnetism and force deserves encouragement."

The above remark was made of Stephen H. Goddard, who has since become the advertising manager of one of the most important industrial publications in America, the ELECTRICAL REVIEW, and who several years ago was selected by the publisher of *Profitable Advertising* as one of its editors, and, as generally known in the publishing field, held that position in connection with other newspaper work for a number of years.

When, as an old friend, I one day asked Mr. Goddard's permission to prepare a sketch of his newspaper career for *Profitable Advertising*, he replied, "Oh, I rather you would wait."

When Goddard was 17 years old he was taken into the New York office of the *National Tribune*, then under the management of Byron Andrews, whose experience as an editorial worker, Washington correspondent and business manager gave young Goddard such a broad insight into publishing and literary work that before the three years of service in this office had expired he was much of the time intrusted with the management and negotiations for advertising, which amounted to perhaps $70,000 a year. While here his first contributions appeared in such journals as *Profitable Advertising*, the *National Advertiser*, *King's Jester* and *Printers' Ink*.

Soon after this, Mr. Goddard was induced by the men who were taking the Boston *Traveler*, after the Committee of One Hundred business men had attempted to show the newspaper fraternity how a daily ought to be conducted, to join that publication staff, and was placed in an important position in touch with the business and editorial policy to undertake a line of special work. It was at this time that I witnessed the interview referred to in the first part of this sketch, and though the interviewer was at that time unknown to me, made an impression on my mind sufficient to keep it in my memory as a remarkable illustration of force and tact, and an ability for reading character.

Evidently here his ambition, supported by a too energetic nature, was dangerous, and his failing health compelled him to resign all his New England connections, giving up his work as associate editor of *Profitable Advertising*, which he was also carrying at that time, and to take a long vacation. It was hardly six months, however, before he was back in his saddle, not returning to the Boston *Traveler*, though his position had been kept open for him, but to the *Forum Magazine*, co-operating with Eugene F. Presbrey and Talmadge Hand in the preparation of railroad and pleasure-resort supplements. His work here attracted the attention of the publishers of *McClure's Magazine*, and under his signature the first elaborate advertising supplement was published in that magazine.

As advertising manager of the ELECTRICAL REVIEW, Mr. Goddard is a constant traveler, finding time for much literary work, and, though still under 25, he is favorably known in the publishing field as a young man of strong individuality and of unusual versatility in publishing and journalistic work.

Electric Lighting at the Tennessee Centennial Exposition.

The official test of the incandescent lighting of the auditorium and Woman's Building at the Tennessee Centennial and International Exposition at Nashville, Tenn., was made Thursday night, August 20, 1896, under the direction of J. W. Braid, chief of the Department of Electricity.

It was a bright, moonlit evening, and the beautiful white buildings shone out with a gentle loveliness that can hardly be imagined. The party present comprised the director-general, members of the Executive Committee and Centennial Directory, Centennial officials, members of the City Council, ladies and children, and newspaper reporters.

The auditorium was first lighted. In this vast building the main light will be furnished by arc lamps, but enough incandescent lights have been put in to supply light in case the arc lights fail. These incandescent lights were turned on and gave light sufficient for all ordinary purposes. Their effect emphasized the vastness of the auditorium.

After admiring this building, the audience passed through the long arbor to the Woman's Building. This arbor is several hundred feet in length, running west from the auditorium. Arriving at the Woman's Building, the lights were turned on, flooding the whole interior. The two little end porticos of Grecian design were brilliantly lighted, the front of the building had a row of incandescent lamps, and the interior was bountifully supplied. Two hundred and thirty lights, or one-third of the total, were turned on. These are arranged in four circuits, and these four circuits will extend throughout the building, so that if one or two, or even three, circuits fail, there will still be enough light for necessary purposes. There is also a small circuit of lights which will be kept burning for guard purposes throughout the night.

An exchange is being put up at Amsterdam, N. Y., in opposition to the Hudson River Telephone Company, who now have about 200 subscribers. The rates will be somewhat lower than charged by the Hudson River Telephone Company, and a large exchange is expected. They have contracted for a storage automatic system. W. Wendel is the president of the new company and Wm. Charles secretary.

OUR CANADIAN LETTER.

SISTOWELL, ONT.—The Sistowell Gas Company will probably put in an electric plant.

PRESCOTT, ONT.—The Electric Light Company contemplates adding to their plant.

TORONTO JUNCTION, ONT.—The City Council is going to buy a new 40-light dynamo.

BROCKVILLE, ONT.—An electric light plant for the asylum will probably be installed.

OTTAWA, ONT.—An electric railway is proposed to run between Richmond and Ottawa.

BRANTFORD, ONT.—The Brantford Electric Light Company will put in new machinery to cost $25,000.

WINCHESTER, ONT.—It is probable that the local authorities will install an electric light plant here.

OTTAWA, ONT.—M. J. R. Booth will put two arc machines in his electric light plant at his saw-mill.

OWEN SOUND, ONT.—The Owen Sound Electric Light Company will enlarge their plant to supply power.

QUEBEC, QUE.—The Electric Railway Company propose to commence the construction of the road at an early date.

SHULENACADIE, N. S.—A gentleman from Halifax is considering the question of installing an electric light plant here.

CORNWALL, ONT.—The prospects of the Cornwall Electric Railway are good. It carried 10,000 people on a recent holiday.

ST. THOMAS, ONT.—The City Council will submit a by-law to the ratepayer for the establishment of a city electric light plant.

HAMILTON, ONT. — Negotiations are still pending for the conversion of the Hamilton & Dundas Railway into an electric road.

HAMILTON, ONT. — The shareholders of the Hamilton-Dundas Railway have approved of the conversion of the road into an electric line.

HUNTSVILLE, ONT.—Mr. Vaughan, Mr. Roberts, C. E., of St. Catherines, has prepared plans and specifications for an electric light plant, and the work will shortly be advertised.

THOROLD, ONT.—The company that intends building an electric railway between Hamilton and Niagara Falls will build a power-house on the site of the Morning Star grist-mill at Decews Falls.

MONTREAL, QUE.—The Montreal Park & Island Railway Company purpose erecting two new power houses, one at Lachine and the other at St. Laurent. The plans are now in course of preparation.

PETERBOROUGH, ONT.—The Auburn Light and Power Company has been organized here. The promoters are Messrs. James Kendry, M. P., John Carnegie and W. H. Meldrum. The company will supply light and power.

HAMILTON, ONT.—M. F. G. Beckett, the promoter of the Hamilton, Chedoke & Ancaster Electric Railway, is said to have secured the necessary right of way, and steps will be taken at once to complete the organization of the company.

COBOURG, ONT.—The Canadian Electric Railway and Power Company seeks power to build an electric railway from Cobourg, via Port Hope, Bowmanville, Oshawa, Whitby, Toronto, Oakville and Hamilton, to Suspension Bridge and Niagara Falls.

J. A. C.

MONTREAL, August 29.

Hardening Steel by Electricity.

If some tests made by M. Taux, a Swiss engineer, living in Strasbourg, are confirmed by further practical experience, the effect on the manufacture of tools will be extraordinary, for it will be possible to make tools hard enough to shape metals with as great ease as that with which wood is now worked. With an electrically tempered drill he bored through a piece of cast steel of the kind used for shells twice as quickly as it could have been done with the best drill obtained by the ordinary methods. When the tool was afterward closely examined through a microscope, it showed no signs of wear. An electrically tempered circular saw cut through bars of iron as if they had been wood. With a chisel of electric steel, a steel bar one by one-half inch was cut, though cold, the operation being repeated five times on the same bar. The same tool then cut through a plate of cast steel (cold) a quarter of an inch thick, and the edge showed neither fissure nor abrasion afterward. In another test an ordinary table knife, that had been tempered by M. Taux's process, cut 11 times through a wire one-eighth of an inch in diameter as easily as it would have cut through a piece of string. The process is said to consist in tempering the articles after heating them in a conductive bath traversed by an electric current.

Manufacturers and the Banks.

[*From the Iron Age.*]

It is exasperating in the extreme for those who employ large numbers of men to be cut short in their banking facilities and at the same time see speculators maintaining the most cordial relations with bank managers. At a time when financial stringency makes it difficult for employers to collect enough funds weekly to pay their help, millions of cash have been locked up in one of our large cities by a small group of speculators who thought there was no limit to the capacity of a bubble and blew it until it burst. Complacent bankers advanced the funds needed, meanwhile curtailing manufacturers' and merchants' credits. These remarks are prompted by the experience of manufacturers whose appeals for regular banking accommodations have been unsuccessful. Among them are companies manufacturing seasonable goods, and whose materials and labor must be paid for several months in advance of sales. They have been told that ordinary conditions do not apply this year and to get money elsewhere if they can. Cases like these deserve better treatment, and banks should use their reserves to reasonable extent for the mitigation of hardships ruling in business circles.

The Dumoulin Copper-Depositing Process.

A process of some possible potential importance is being experimented with in England for the purpose of depositing copper electrolytically, in the form of sheets and tubes, direct from the matte or precipitate, says the *Engineering and Mining Journal*. It will be remembered that the Elmore and similar processes have proved failures, owing to the sheets and tubes thus made lacking strength and homogeneity.

The present process is the invention of M. Emilien Dumoulin, of Paris, or at least he is the patentee, the actual inventor being a metallurgist and chemist in his employ. The essence of the invention is the special method for rendering the arrangement of the deposited molecules perfectly homogeneous, and thus obtaining uniform strength in the tube as it is formed on the revolving mandrel. In the Elmore process it was endeavored to attain this end by continually pressing on the deposit with an agate edge; but the results did no fulfill expectations, for the agate edge not only did not render the deposit homogeneous, but also did not make the succeeding layers adhere to one another. In the Dumoulin process a body impregnated with greasy matter is placed in contact with the mandrel, so that if any irregularities occur in the deposition of the metal the projecting portions press into the body and squeeze out and become covered with grease. As the grease is a non-conductor, further deposition can not take place on the prominences, but is confined to the hollows. When the metallic surface becomes level again, the grease is automatically rubbed off or taken up again by the body. In this way irregularities of deposit are prevented, and so little pressure is put on the surface that lamination does not occur.

The patent for this process has been acquired by an English company, organized by Mr. R. M. Moir, who was once connected with the Rio Tinto Company. Mr. Moir has interested the Rio Tinto people and Messrs. Matheson & Company, and they and Mr. McKechnie, a Widnes smelter, have conducted severe tests of the process. The tests for strength made by Kirkaldy show a breaking stress varying from 45,000 pounds to 52,000 pounds per square inch, with an elongation from 10 to 21 per cent, very high figures. The specific gravity of the copper is 8.94, and the electric resistance is 1,580 to 1,590.

The Busy Advertisement.

The advertisement and the gas meter have many points of similarity—both work day and night, in good weather and bad, and neither gets drunk.

The new electric railway between Frederick, Md., and Braddock Heights, at the top of the Catoctin Mountain, was opened for traffic on August 17.

The erection of an electric lighting plant is being agitated at Bambridge, N. Y.

Mark A. Replogle.

The interest evinced in the series of articles on "Electricity and Water Power," concluded in the last issue of the ELECTRICAL REVIEW, leads us to believe that a sketch of the career of the author, Mr. Mark A. Replogle, will also be of interest to our readers. Mr. Replogle has probably had more experience as a practical engineer in the development and governing of water powers for the generation of

MARK A. REPLOGLE, ENGINEER. AUTHOR OF "ELECTRICITY AND WATER POWER."

electricity than any other man in the United States. He is the inventor of the Replogle electric governor for water-wheels, and has taken out numerous patents for inventions in this line of work.

In 1891 the first governor constructed under his patents appeared, and since then their manufacture and sale have rapidly increased. The later types are all relay governors. Mr. Replogle was the originator of draft tube governing in this country, a good illustration of which is the plant at Ithaca, N. Y. Mr. Replogle has visited and inspected nearly all the electric water-power plants in the United States and Canada. His series of articles on "Electricity and Water Power" was suggested by learning of the many impracticable ideas that seemed to prevail with engineers and others who were called upon to handle electric water-power plants. Mr. Replogle is at present chief engineer for the Replogle Governor Works, of Akron, Ohio. This company, under his direction, has installed work in many of the finest water-power plants in the United States.

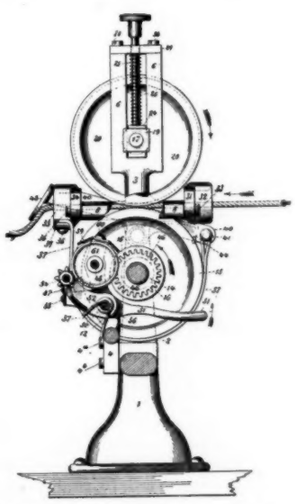
Mark A. Replogle was born in Blair County, Pennsylvania, September 8, 1861. Until the age of 18 he lived on a farm, and then went West alone to grow up with the country. He landed in Hampton, Iowa, and pursued various lines of employment until he was 24 years old, when he began a didactic course at the Iowa State Normal School, in Cedar Falls. He finished this course at the age of 27, and then spent a year in teaching.

About this time a stranger to Mr. Replogle, named H. H. Clay, of Cedar Falls, Iowa, urged him to take a part in handling, as a salesman, the Pritchard electric water-wheel governor. He met with a year of indifferent success. Mr. Replogle, after a square look at the problem, decided to spend his time and energy in solving the question of making water power a successful source of energy for driving dynamos. The governor problem has always been uppermost in Mr. Replogle's mind, and he believes he can now demonstrate scientifically that water-power plants can be so constructed as to be governed equal to steam governing.

Candee's Wire-Measuring Machine.

Capt. Willard L. Candee, managing director of the Okonite Company, Limited, 253 Broadway, New York city, is the inventor and patentee of the wire-measuring machine illustrated herewith. In this device the measurement of the material is positively controlled, and a visible registry of the number of inches, feet, yards or other unit is actuated simultaneously with the operation of the rolls between which the material to be measured is forced or drawn. The objects of the machine are, first, to provide rolls for positively measuring the material and means for automatically controlling the rolls; second, to operatively combine with the rolls registering wheels or dials, which will be actuated simultaneously with the movement of the measuring rolls, and, third, to provide means for throwing the registering wheels out of engagement with the measuring rolls to permit the return of the registering wheels to zero when desiring to again commence measuring.

Heretofore, when selling wire, whether bare or insulated, sales have usually been based on the cost of a pound or a fraction thereof; but it



CANDEE'S WIRE-MEASURING MACHINE.

has been found to be preferable to sell the wire by the foot or yard. Captain Candee's device provides at a small cost a simple apparatus for carrying out this process. The machine may also be advantageously used to measure tape, cloth, etc.

OBITUARY.

Prof. William Shrader, head of the department of electrical engineering in the University of Missouri, at Columbia, Mo., died on August 13.

Augustus S. Bunker, a well known mechanical and electrical expert and inventor, died at his home in Lawrence, Mass., on August 18, at the age of 76.

Pennsylvania Street Railway Association.

The following is the programme for the fifth annual meeting of the Pennsylvania Street Railway Association which meets at Lakemont Park, Altoona, Pa., on September 2 and 3:

WEDNESDAY, SEPTEMBER 2, 11 A. M.

Address of welcome, by Hon. Martin Bell.

Response, by the president, Hon. B. F. Meyers, of the Wilkesbarre & Wyoming Valley Traction Company.

Papers: "Long-Distance and Heavy Duty Electric Railway," by Mr. F. W. Darlington, electrical engineer; "Construction and Maintenance of Electric Railway Tracks," by Mr. Geo. H. Neilson; "Transfer Tickets," by Mr. J. H. Stedman. For general discussion: "Street Railway Law," "Liability Insurance."

Business meeting, 7.30 P.M.—Complimentary concert to delegates and visitors at Lakemont Park, by the Altoona & Logan Valley Electric Railway Company.

THURSDAY, SEPTEMBER 3.

9.30 A. M.—Excursion to Wopsononock, train leaving Juniata at 9.30 A. M.

2.30 P. M.—Trolley ride over lines of the Altoona & Logan Valley Electric Railway Company.

8.30 P. M.—Banquet, Mountain House, Cresson.

Governor Morton Buys a Storage Battery.

The Electric Storage Battery Company has closed a contract through Messrs. W. T. Hiscox & Company for a storage battery installation for "Ellerslie," the residence of Governor Morton at Rhinecliff, N. Y. The battery, which will be located in the power house, 1,400 feet away from the mansion, will consist of 67 chloride accumulator elements, type G-11, in lead-lined wooden tanks. The generator will be run but a few hours per day, and the battery will carry the lighting load during the time that the dynamo is shut down and over Sunday, thus giving a 24-hour lighting service per day, with but a comparatively very few hours' run of the generator.

Electric Smelting in Sweden.

A company is to be formed in Sweden for the smelting of ores on a large scale under the De Laval patents for electric smelting. The Swedish Government has granted a concession for the establishment of the company, which will have a capital of $4,000,000. The water power at Trollhättan will be utilized.

Beacon Lamp Company's Removal.

On and after October 1, 1896, the Beacon Lamp Company, of Boston, will be located in its new factory at New Brunswick, N.J. With increased facilities of every kind, including a larger and better equipped factory, superior shipping facilities, etc., the company will be in a better position than ever to fill orders promptly.

Pushing for Business.

The Central Electric Company, of Chicago, one of the largest electrical supply houses in the world, has doubled its advertising space in the ELECTRICAL REVIEW, and is preparing in advance for the increase in business which must soon occur. The political and business situations have no terrors for this enterprising house, which appreciates the value of extensive advertising in a season of dull trade. We are ready to welcome the next advertiser who believes in the policy of the Central Electric Company.

Must Work.

[*From an Unknown Exchange.*]

A man may bet,
And a man may sweat,
  And a man may puff and blow;
But he can't get trade
By sitting in the shade
  Waiting for business to grow.

MUST ADVERTISE.

[*The* ELECTRICAL REVIEW'S *Version.*]

A man may work,
Or a man may shirk,
  But he'll never win the prize
Of wealth or fame
Till he "gets up his name,"
  And has learned to advertise.

Cataphoresis.

TO THE EDITOR OF ELECTRICAL REVIEW:

Can you give me any information concerning cataphoresis or electric medication, which means the electric introduction of drugs into the human body through the skin?

Yours truly,
L. E. RICHMOND.

August 23.

Our correspondent is referred to an article entitled, "An Account of Some Experiments Upon the Application of Electrical Endosmose to the Treatment of Concretions," which was published in the ELECTRICAL REVIEW for September 13, 1890, page 30.—ED. ELECTRICAL REVIEW.

LITERARY.

Theodore Roosevelt contributes to the September *Review of Reviews* a characteristic study of "The Three Vice-Presidential Candidates and What They Represent." The time is peculiarly opportune for a re-examination of the vice-presidential office, and Mr. Roosevelt offers some pertinent suggestions as to the proper status of the Vice-President in our scheme of government. He believes that the Vice-President should represent the principles on which the President was chosen to office, that he should have a seat in the Cabinet, and that his official power should be increased in several directions. Mr. Roosevelt's comments on the personalities of the three candidates now conspicuously before the country are direct, pointed and decidedly Rooseveltian.

The first street railway in New York city was built in 1832, from the City Hall to Fourteenth street.

The Electrical Stock Market.

Wall street seems slow to recognize a general improvement in business, although toward the end of the week just passed a little more confidence could be observed. The importation of gold has commenced, and over $15,000,000 is now on its way here. This amount is likely to be considerably increased during the next few weeks.

Politics, of course, has considerable influence in holding down activity in the street. This will doubtless be the case until after election. Every day brings an assurance of McKinley's election and future prosperity.

The stock market during the week was extremely dull and purely professional. General Electric, which has been one of the steadiest stocks in the market, gained a little over last Saturday's price. There were 300 shares sold to-day at 23½ to 24¼. The closing prices were 23¾ bid and 24 asked. Western Union closed at 76⅞ bid and 77 asked.

The closing prices on the Boston Stock Exchange to-day were as follows:

	Bid.	*Asked.*
American Bell Telephone.....	197	198
Erie Telephone.....	56	57
General Electric preferred	55	60

New York, August 29.

Labor Day at Buffalo and Niagara Falls.

Indications point to Labor Day being celebrated at Buffalo and Niagara Falls in a very attractive manner this year. The wheelmen in Buffalo have a particularly attractive programme for that day. The Buffalo Bicycle Club will hold their race meet at Buffalo Athletic Track, Monday afternoon, September 7. There will also be a new departure in the way of running races at night, the grounds being lighted by electricity. The world's champion, John S. Johnson, and Ray McDonald, his racing companion, having just returned from his triumphs abroad, will participate in this meet. J. W. Parsons, the Australian champion, is also entered for the races. In the morning there will be Labor Day parades, both at Buffalo and Niagara Falls.

Aside from the attraction of Niagara Falls, within itself, the West Shore Railroad has made a rate of one fare for the round trip from all points on its line to Buffalo and Niagara Falls, leaving on any train on Saturday, September 5. This will give parties desiring to visit either of these points an opportunity to stay over Sunday and enjoy Labor Day, thereby making a three-day vacation. The fare from New York is $8, and proportionately lower from points along the line of the road.

The Gloversville, N. Y., Electric Company at the recent annual meeting elected these officers: President, James Radford; vice-president, John Marsh; treasurer, Lee B. Crittenden; secretary, Edgar A. Spencer; corresponding secretary, Hugh J. Brady; superintendent, John Begley.

WHY THE ARMATURE OF AN ELECTRIC MOTOR REVOLVES.

BY D. L. BARNES, IN THE BALDWIN-WESTINGHOUSE CATALOGUE OF ELECTRIC LOCOMOTIVES.

The action of the current in producing rotation in an electric motor is quite simple. While many electrical problems are comparatively complicated, the principal elements in the operation of electric railway apparatus may be readily understood.

The fundamental fact is the relation between an electric current and a magnet. If a piece of iron be surrounded by a coil through which current is passed, it becomes a magnet. In Fig. 1 the passage of a current through the coil of wire around the iron bar in either direction renders the iron a magnet, with all the well known properties of a magnet. It will attract iron, and the space surrounding it becomes magnetic. Iron filings will arrange themselves in the direction shown by the dotted lines in the figure. One end of the magnet is a north pole and the other a south pole.

If a wire, such as C D, be moved past either pole of the magnet, there will be a tendency for current to flow in the wire either from C to D or from D to C, according to the character of the pole past which it is moved and to the direction of the movement. If the ends of the wire C D are joined by a conductor, so that there is a complete circuit, a current of electricity will flow through the circuit. This circuit may be either a simple wire, as shown by the line C E F D, or it may be the windings on machines enabling the current to produce mechanical work, or it may be electric lamps producing light. The essential feature is that there shall be a complete path from C to D for the current to flow, no matter how complicated the circuit may be.

The reason why there is a tendency for an electric current to flow in the wire C D when it is moved in the vicinity of a magnet is not known. There are several theories, all more or less involved and depending upon pure assumptions as to the nature of an electric current. For all practical purposes it matters not what the reason is; the fact that current flows when there is an electric pressure in a closed circuit is the important thing, and it serves all useful purposes to know that current does flow and that its direction and amount are always the same under similar circumstances. There are many facts in mechanics that are accepted and used practically, about which little is known as to the fundamental and primary causes, and this fact about motors and dynamos is, therefore, only one of many, which all must accept without a full and complete explanation.

The intensity of the electric pressure, or electro-motive force, depends upon the velocity of revolution of the wires and upon the strength of the magnets, and the quantity of current depends upon the electro-motive force and upon the amount of the resistance in the circuit. Other things being equal, the current through a long small wire, or greater resistance, will be less than through a short thick one, or a less resistance.

Having seen that, when a wire is moved in the vicinity of a magnet, an electric pressure is produced which will cause a current to flow in a closed circuit, one can easily conceive of many ways in which a current of electricity may be generated by combining magnets and wires so that there will be a relative motion between them. In order to make a continuous flow, the relative motion must be continuous, and if the current is to be uniform, the motion must be uniform.

Two electro-magnets are shown in Fig. 2, in which the north pole of one magnet is near the south pole of the other, and the magnetic field between the two lies in approximately straight lines between the two magnets, as indicated by the dotted lines. If the wire C D be moved across this field and its ends be joined, as by the dotted circuit C E F D, a current will flow in this circuit. The wire C D may be made to revolve around the wire E F, passing in front of one pole and then in front of the other pole, as in Fig. 3. The current in the circuit will pass in one direction when the wire is passing one pole, and in the other direction when it is passing the other pole. The connection between this elementary arrangement and the dynamo is easily recognized. In the dynamo a magnetic field is produced by the electro-magnets, called "field poles," and a considerable number of wires, similar to the wire C D, are placed upon an armature so that they revolve in front of the poles. Each individual wire produces current first in one direction and then in another direction, as explained above; but if there be many wires, there will always be the same number in front of the north or positive pole and the same number in front of the south or negative pole, so that the total or resultant action is practically uniform and may be made to produce a continuous current. Such a machine is the common dynamo or motor.

A dynamo transforms mechanical into electrical energy, and a motor transforms electrical into mechanical energy. The two operations are reversible and may be effected in the same machine; a dynamo may be used as a motor or a motor may become a dynamo. A machine is a motor when it is driven by a current of electricity, and it is a dynamo when it is driven by mechanical power and produces an electric current. If a motor be driven by an engine, it can deliver a current of electricity which is able to operate other motors or electrical apparatus or lights. A simple form of electric machine is shown in Fig. 4, which is the general form of the electric motor. In this there are two projections of steel, H and G, which are made electro-magnets by the current going

through the wires wound around them from any source of electricity, such as a battery at I and J. These magnets have poles facing toward a drum, K, revolving on a shaft. The poles G and H are called the "salient" poles; the poles M and P are called the "consequent" poles. The magnetic flow or field is shown by the dotted lines. On the periphery of the drum are arranged wires in the slots shown. As this drum is revolved there will be a tendency for electricity to flow in the wires. In order to get a current of electricity from these wires it is necessary to make a complete circuit. As each of the wires in the slots passes in front of a pole, a pressure or electro-motive force will be generated, and its direction will depend upon whether the pole is a north or a south pole.

The pressure or electro-motive force generated in the wires moving in front of the positive or north field poles will be in one direction, while those in front of the negative or south poles will be in the opposite direction. Therefore, if two such wires be connected together at one end of the armature, the free terminals of the wire at the other end of the armature will have the sum of the electro-motive forces generated in the two wires. The wires so connected can be considered as a turn of a single wire, instead of two separate wires, and this turn may be connected in series with other turns, so that the resulting electro-motive force is the sum of that in all the turns and all the wires so connected. It is customary to connect the coils of an armature so that the electro-motive force given is that obtained from half the coils in series. The other half of the coils is connected in parallel with the first half, so that the currents flowing in the two halves will unite to give a current in the external circuit equal to twice the current in the two armature circuits or paths.

It is evident that, as the armature revolves, wires which were in front of the positive pole will pass in front of the negative pole, and that in order to maintain the electro-motive force it will be necessary to change the connections from the armature winding to the external circuit in such a way that all the wires between the two points of connection will have their electro-motive forces in the proper direction. The connection to the armature must, therefore, be made not at a definite point in the armature itself, but at a definite point with reference to the field magnets, so that all the wires between two points or contacts shall always sustain the same relation to the field magnets.

For this purpose a device known as a "commutator" is provided. The commutator is made up of a number of segments, as shown at A, in Fig. 5, which are connected to the armature winding. On the commutator are sliding contracts or brushes, which bear on the segments and are joined to an external circuit, making a continuous path through which current may flow. As the commutator revolves, the different segments come under the brushes, so that the relative position of the armature wires between the brushes is dependent on the position of the brushes. The armature wires which connect the brushes are those sustaining the desired definite position to the field magnets, so that the currents from the armature at all times flow properly into the external circuit, although individual armature wires carry currents first in one direction and then in the other direction, depending on the character of the pole in front of which they may be moving.

On two-pole machines there are two brush-holders, each containing one or more brushes. On the four-pole machine there may be either two or four brush-holders, and on a six-pole machine, either two, four or six brush-holders.

If the current delivered by a dynamo does not flow in the desired direction, it can be reversed by shifting the wires in the binding posts or by throwing a switch. If the motor does not revolve in the desired direction, it can be made to do so by reversing the connections to the armature or field coils; so that, without knowing which way a current of electricity is to be generated, any practical man can make a motor revolve in a proper direction by simply changing the connections.

It is natural that a machine which gives out electric energy when driven by an external power will, when electric energy is delivered to it, reverse its action and give out mechanical power and do work. This is not a logical reason why a motor revolves under the influence of an electric current, but it is a natural inference which assists in comprehending the fact.

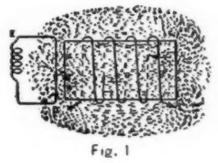


Fig. 1

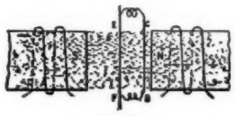


Fig. 2

Fig. 3

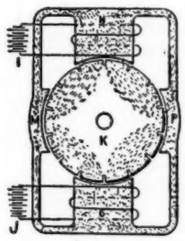


Fig. 4.

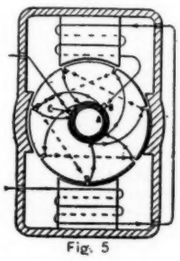


Fig. 5

DIAGRAMS ILLUSTRATING PAPER ON "WHY THE ARMATURE OF AN ELECTRIC MOTOR REVOLVES."

A single path of the current through the commutator and armature winding is shown by the arrows on Fig. 5. The brushes B and C are placed on the top side of the commutator to make them more accessible, and this gives a peculiar but simple armature winding.

For the sake of simplicity, the batteries I and J, of Fig. 4, are not used on common forms of generators or motors, but the current that flows from the armature through the commutator is made to flow through the electro-magnets either in whole or in part. If all of the armature current flows around the electro-magnets or fields of the machine, it is a "series" machine; if only a part of the current is used in this way, it is a "shunt" machine; that is, some of the current is "shunted" through the fields. Sometimes both the shunt and series windings are used, and in that case the machine is called a "compound-wound" machine. Such a machine has a large wire through which the main current passes, and a fine wire through which the shunted current flows. Fig. 5 shows how the commutator and the fields are connected, and how the current flows from the wires in the armature through the commutator in a series machine.

Perhaps the simplest way to explain the cause of the movement of an electric motor, when supplied with a current, is to compare the action to the well known attraction of unlike poles or magnets and the repulsion of like poles. Unlike poles are north and south; like poles are two north or two south. In any motor the current through the field causes a north or south pole to be maintained, and the current through the armature and brushes causes an opposite polarity. These constantly maintained unlike poles attack each other and pull the armature around on its axis.

It has been explained that if a motor be driven by a belt, an electro-motive force is produced and the machine acts as a dynamo. It is also a fact that an electro-motive force is produced whether the power for driving the machine is obtained from a belt or from the electric current; that is, whether the machine be driven as a dynamo or as a motor. In a dynamo, however, the current flows out in the direction in which the electro-motive force is acting. In a motor the electro-motive force produced has a direction opposed to the direction of the flow of current. This may be illustrated by the following experiment:

Two similar machines are driven independently at 600 revolutions and give an electro-motive force of 100 volts. Similar terminals of the two machines are connected together. No current flows between the machines, because the two pressures are the same and are opposed in direction. If now the belt be thrown off from one machine, its speed will begin to fall. This will lower its electro-motive force below that of the other machine or dynamo, but will not change the direction of the force. There will now be a difference of pressure in favor of the machine which is driven, and it will now send a current through the other machine and run it as a motor. The speed of the motor will continue to fall until the difference in pressure or electro-motive force between the two machines is just sufficient to cause the flow of enough current to keep the motor running against whatever frictional resistance and other resistance there may be. The electro-motive force generated in the motor, which is against or counter to that of the current in the circuit, is called the "counter electro-motive force."

In order to determine how fast a motor will run without doing work under any given pressure, it is not necessary to know anything about the dynamo that furnishes the pressure. The pressure alone is sufficient to determine the speed of the motor. For instance, if a motor will give a pressure of 500 volts when running free at 100 revolutions, it will always run at about 100 revolutions when not doing work on any electric circuit where the pressure is 500 volts.

This description of a motor or dynamo carries with it all of the fundamental theory of electrical generators and motors that it is necessary for a mechanic to know in order to take reasonably intelligent care of electric locomotives. Further useful knowledge must be attained by studying the different types of electric motors and dynamos. These other types all have the same fundamental theory, even when the construction is quite different. It has been the aim in devising these electric locomotives to adhere as closely as possible to a uniform type for all sizes, so that when a mechanic has once grasped the fundamental design of one size he will be familiar with the other sizes.

It is reported that negotiations have been opened for a consolidation of the Second avenue and Dry Dock, East Broadway and Battery Railroad companies, of New York city, with a view to economy of management and re-equipment with new motive power. This would make a system of about 25 miles of road, or almost the mileage of the Third avenue system, including Forty-second street and Boulevard lines. Capital stock and bonded debt of Third avenue are now $16,600,000. Stock and bonds of Second avenue and Dry Dock together are $7,000,000.

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

Electric Light and Power.

SALT LAKE CITY, UTAH—The contract has been awarded to Mr. William Fisher, of Ogden, for the building of the power house of the Pioneer Electric Power Company.

NEWARK, N. J.—It was rumored in business circles that John B. Morgan, of Philadelphia, had purchased the Newark Electric Light and Power Company, of this city, or secured a controlling interest in it by the purchase of $500,000 of its stock.

NEWPORT, R. I.—A contract has been closed with the Newport Electric Lighting Company to light the streets of the village.

GREENSBURG, PA.—The Kelly & Jones company are erecting an electric light plant for their own use at their steam fitting and valve works.

DAWSON, GA.—The contract for an electric light plant at this place has been let to the Fort Wayne electrical corporation, of Fort Wayne, Ind.

BARNESVILLE, GA.—This city will issue $7,000 worth of bonds for the erection of an electrical plant.

BERKLEY, VA.—A charter has been granted the electric light and power company of this city, with a maximum capital of $50,000. E. M. Tilley is president.

CENTRAL CITY, KY.—Central Coal and Iron Company will probably operate an electric light plant in connection with their mining plant.

ROME, GA.—The new electric outfit at the Rome Rolling Mills has been completed.

BRUNSWICK, GA. — Address F. Henry Dunwoody, Mayor, concerning erection of electric light plant.

ROSSVILLE, GA.—The Park Woolen Mills will put in an electric light plant.

WAYNESBORO, GA.—A movement is on foot to establish an electric light plant.

ST. CLOUD, MINN.—John Hoeschen will put in an electric light plant, for which he has been granted a 10 years' franchise.

HIGH FALLS, GA.—Seaton Grantsand and J. D. Boyd have bought the High Falls water-power property and will develop same. An electrical and manufacturing plant will be established in connection with the plant.

CENTRAL CITY, KY.—The Central Coal and Iron Company will put in an electric light plant.

GRENADA, MISS.—Jas. Pryor & Company are mentioned in connection with the erection of an electric light plant.

KINSTON, N. C.—Bonds will be issued to the amount of $8,000 for the electric light plant. Complete equipment will be wanted.

TAYLOR, TEX.—The Taylor Electric Light Company is making some improvements in its plant.

LYNCHBURG, VA.—The Rivermont Electric Light Company has purchased and is putting in a new armature.

LE MARS, IOWA—The Le Mars Water and Light Company has been incorporated, to purchase, maintain and operate waterworks and electric light plant. Capital stock, $150,000.

DEXTER, MO.—An electric light plant is to be put in at this place.

GORHAM, ME.—The United Indurated Fibre Company, Lockport, N. Y., will soon begin to build an electric power plant at Great Falls, on Presumscott River.

MOHAWK, N. Y.—An electric light plant will be constructed.

WEST NEWTON, PA.—The West Newton Borough Electric Light Company will enlarge the electric light plant.

ABERDEEN, MD.—Fifteen thousand dollars will be issued in bonds for the electric light plants and waterworks.

HIGHPOINT, N. C.—Steps are being taken to form a company to install an electric light plant to furnish incandescent lights to private subscribers, business houses, etc.

LAURENS, S. C.—A $27,375 electric light plant and waterworks will be constructed.

BRUNSWICK, GA.—A franchise will be granted by the city for electric lighting.

CUTHBERT, GA.—Address R. L. Moye, Mayor, concerning establishment of an electric light plant, for which $7,000 will be voted.

FRANKFORT, KY.—A large plant for electric lighting is to be put in at this place.

GALLIPOLIS, OHIO—Fifteen thousand dollars has been voted for an electric light plant.

MIDDLEBURY, VT. — There is a project on foot to extend the Bethel Electric Light and Power Company's line to Randolph.

WHITINSVILLE, MASS.—The Whitin Machine Company is about to put in an electric lighting plant. The building will be 102 feet long, 50 feet wide and one story high, with a basement. It will be equipped with engine, boilers, dynamos and a steam fire pump. The building will be of brick, and John Sherman, of North Uxbridge, has the contract.

BELLEVUE, IOWA—Address City Clerk concerning new electric light plant which is to be established. Contract let.

New Electric Railways.

CINCINNATI, OHIO — Cincinnati has consolidated her street car lines and claims that she is going to have the finest street railway system in the world. The company will be required to make improvements which will cost $2,500,000 during the next 18 months.

CHICAGO, ILL.—The Central Electric Street Railway Company and the Cosmopolitan Electric Company are negotiating to form a coalition, under which the Central Electric hopes to build street car lines and operate cars without the necessity of going to the council for a franchise.

MOBILE, ALA.—The Mobile Light and Railway Company has secured a charter to construct an additional electric line in the city.

MACON, GA.—A number of business men have organized a company and will build an electric railway from Macon to a new town across the Ocmulgee River.

SAN FRANCISCO, CAL.—An electric road will be built from this place to San Jose.

TACOMA, WASH.—The American Lake Line will construct a new connection between the Jefferson avenue line and Edison, to be equipped with electricity.

AUGUSTA, GA.—The Augusta Railway and Electric Company will buy and operate the plant of the Thomson-Houston Electric Company. The plant is worth about $115,000.

MERRILL, WIS.—The street-car system at this place will soon be in operation again. A new car barn has been built and new cars received.

CHICAGO, ILL.—The Chicago City Railway Company has taken out a permit to erect a new car house and barn on Cottage Grove avenue, on the site of the structure destroyed July 18, to cost $75,000.

OXFORD, MASS.—The people contemplate forming a company for purpose of building an electric railroad in this place, and have informally decided to form a corporation, procure their franchise and build some of the road in the near future.

BELLEVILLE, N. J.—The Union Traction Company, of Bergen County, wants a franchise through this place to connect with the Newark trolley lines of the Consolidated Traction Company.

MORGANTON, MD.—Plans are on foot to build a trolley road from this place to Blowing Rock, 26 miles.

New Manufacturing Companies.

PORTLAND, ME.—Dynamotor Electric Company has been incorporated, for the purpose of buying, selling and dealing in electric motors, dynamos, etc., with $3,000,000 capital stock. Officers: President, J. R. Hadder, of Winthrop, Mass.; treasurer, Frank McMullen, of Winthrop, Mass.

CONWAY, ARK.—The Conway Electric and Manufacturing Company has been incorporated by D. R. Jones, G. H. Burr and Nora D. Grisard, to manufacture and distribute electricity, etc. Capital stock, $12,000.

NEW BRIGHTON, N. Y.—The Richmond Borough Electric Company has been incorporated, to operate in New Brighton, Edgewater, Port Richmond and other towns in Richmond County. The capital is $400,000 and the directors are Albert E. Leon, of Boston; Henry Dun Wiman and Daniel Campbell, of West New Brighton; William L. Douglas and John J. Whipple, of Brockton, and William A. Clark, Jr., and William B. Littlefield, of Lynn.

WORCESTER, MASS.—The Columbia Electric Company has been incorporated by Frank E. Gilbert, John P. Coglin and James J. Rafferty. Capital stock, $10,000.

CHICAGO, ILL.—Consolidated Car and Truck Company has been incorporated; capital stock, $500,000; to operate street railway lines and manufacture cars. Incorporators, George C. Mastin, Catharine Mastin and Sherley Schoeler.

New Telephone and Telegraph Companies.

NEW HAVEN, CT.—The Southern New England Telephone Company has just purchased a telegraph line formerly used by the Baltimore & Ohio Telegraph Company between Manchester and Putnam, in this State, a distance of 32 miles, and will use the line in connection with telephone business.

DUNKIRK, N. Y.—A franchise has been granted to the Automatic Telephone Service Company to construct a telephone plant in this city, such plant to be in operation by January 1, 1897.

ST. CHARLES, MO.—Mr. C. K. Sitton, manager of the telephone system connecting various cities in Lincoln, Audrain and Pike counties, is making arrangements with the authorities of the St. Charles Telephone Exchange by which the two systems will be connected. This will put St. Charles in direct communication with a majority of the most prominent North Missouri towns. Work will begin at once on the proposed improvement.

TALLADEGA, ALA.—A telephone is to be put in at this place.

Business Troubles.

NEW YORK, N. Y.—The Archer & Pancoast Company, manufacturers of gas and electric light fixtures, is financially embarrassed and has gone into the hands of receivers. Justice Smyth, of the Supreme Court, appointed Albert C. Hetherington, William S. Fearing and Peter F. Meyer receivers.

CLEVELAND, OHIO—Suit for $20,658.49, with interest at six per cent, was brought by James A. Crawford against the E. & C. Electric Company.

CHICAGO, ILL.—The Dearborn Electric Company, which carried on business at 19 Quincy street, has made an assignment in favor of Warren A. Drake as assignee.

KINDRED INTERESTS

The Safety Insulated Wire and Cable Company, of New York city, has on hand a large number of orders for its well known brands of cable and wire, and its well equipped factory is busily engaged in filling them.

The White-Crosby Company, 29 Broadway, New York city, are proceeding rapidly with the construction of the transmission line between Niagara Falls and Buffalo. The poles are all on the ground and contracts for the wire have been let.

The American Stoker Company, of Dayton, Ohio, has recently furnished the following stoker equipments: Pennsylvania Railroad Company shops, Columbus, Ohio, second order; Davis & Egan Machine Tool Company, Cincinnati, Ohio; Toledo Brewing and Malting Company, Toledo, Ohio; Michigan Carbon Works, Detroit, Mich., second order; John C. Roth Packing Company, Cincinnati, Ohio; Cleveland City Waterworks, Cleveland, Ohio.

The growth of the application of storage batteries in fire-alarm work, displacing gravity cells, is indicated by the fact that during the past two years 10,422 chloride accumulators manufactured by the Electric Storage Battery Company, of Philadelphia, have been installed in that service. Forty-seven cities are now equipped with the storage system. The Gamewell Fire-Alarm and Police Telegraph Company is installing chloride accumulators wherever conditions permit.

J. H. Bunnell & Company, 76 Cortlandt street, New York city, the well known electrical supply house, have just issued their new catalogue No. 15. It is very complete, compact and conveniently arranged. There are nearly 800 illustrations, many of them entirely new. The front cover is embellished with a reproduction of the World's Fair diploma awarded to J. H. Bunnell & Company. They have also issued a new edition of Wells's "Electropathic Guide," a copy of which is furnished free with their No. 4, D. D., medical battery. Both books are ready for distribution, and will be sent to any address on application.

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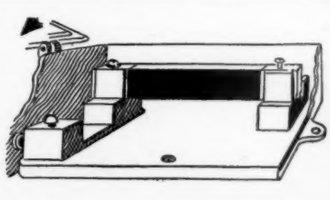
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ELECTRICAL PATENTS

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED AUGUST 25, 1896.

566,288 Ring armature; F. B. Badt, Chicago, Ill.

566,298 Fac-simile telegraphy; H. W. Cox, London, England—A transmitting metallic cylinder, a threaded metallic axle supporting same on metallic standards, a non-conducting paper with permeated conducting traces marked thereon mounted on cylinder by attachment clips, all adapted to complete electrical continuity, and a spring-pressed stylus.

566,313 Self-winding electric clock; E. G. Hammer, Brooklyn, N. Y.

566,334 Apparatus for registering the number of telephonic conversations; A. Munch, Charlottenburg, Germany—A registering mechanism having a rotary ratchet wheel, a pawl operating said wheel tooth by tooth and having a locking projection, a locking disk connected to said ratchet wheel and limiting its movement and having stopping faces engaging the locking face of said pawl at predetermined positions of the pawl and ratchet, and thereby arresting movement of the latter.

566,341 Electric heater; H. O. Rockwell, St. Louis, Mo.—A plate, forked ends forming a part of the same, cap pieces adapted to be received by said forked ends, and a suitable resistance coil carried by the plate, said coil being wrapped about the body of the plate, and the successive windings or wraps of the coil passing through the space included between the forked ends and the adjacent surfaces of the body of the plate and cap pieces.

566,366 Brush holder for dynamo-electric machines; C. E. Woods, Chicago, Ill.—Comprises a frame having a series of brush-holding devices connected therewith, each brush-holding device provided with a movable part adapted to engage the brush, and a series of elastic connecting devices, connecting said movable parts together, whereby the brushes when in position are elastically forced against the commutator.

566,397 Electric railway conduit; W. S. Hull, Dallas, Tex.—A horizontally divided conduit, a continuous metallic conductor and a sectional metallic segmental conductor laid upon the upper interior wall thereof, and insulated from the same and from each other, and an inner insulating tube held between the sections of the conduit, and a hollow metallic spherical switch adapted to travel bodily through the conduit in contact with said segmental conductor.

566,416 Telephone apparatus; C. J. Schwarze, Adrian, Mich.

566,436 Method of and apparatus for cutting off glass articles; F. Woodruff, Rochester, Pa.—The method of breaking or cracking off glass articles, which consists in applying along the line where the glass is to be cracked a thin jet of heated air or gas, and then applying a similar jet of cold air or gas along the same line.

566,468 Insulator support; J. B. Oliver, Shield's Station, Pa.

566,503 Automatic signaling; J. P. Culgan, Swissvale, Pa.

566,507 Conduit outlet insulator; F. W. Erickson, Revere, Mass

566,532 Electric despatch system; C. F. Pike, Philadelphia, Pa.—A tube, exhausting mechanism therefor, a transmitter having end gates and an exhaust pipe, a receiver having end gates, one of which is controlled in its closing movement by a carrier or vehicle, exhausting mechanism and air-supply devices for the receiver, electro-motor for a carrier or vehicle and a line conductor in said tube for said electro-motor carriers.

566,537 Electrical hammering machine; T. C. Robinson, Boston, Mass.

566,541 Electric switch and signal apparatus; J. G. Schreuder, Wilkinsburg, Pa.

566,542 Electric railway; C. Skinner, Chicago, Ill.

566,545 Electric heating apparatus; R. A. L. Snyder, Pittsburgh, Pa.—An open magnetic core, a short-circuited secondary entirely surrounding the said core, a primary coil wound on the outside of the said short-circuited secondary.

566,564 Electric heating device; M. W. Dewey, Syracuse, N. Y.—Transparent or semi-transparent imitation fuel, an electric device for illuminating the same, and an electric conductor for generating heat.

566,573 Electrical indicating and cut-out apparatus for portable or other electric lamps; R. Hacking, Nottingham, England.

566,612 Alarm for boilers; J. O'Connor, New York, N. Y.

566,648 Telephone exchange system and switching apparatus; A. B. Bennett, London, England.

566,652 Arc lamp hanger; W. S. Bosely, Chicago, Ill.

566,693 Electric rheostat; H. W. Leonard, New York, N. Y.—A motor-starting rheostat, consisting of a conductor p'aced between and in intimate contact with, but insulated from, two walls of material having a high specific capacity for heat.

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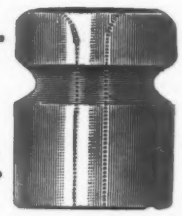

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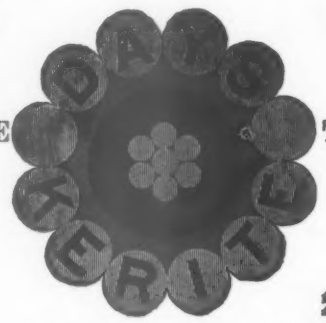

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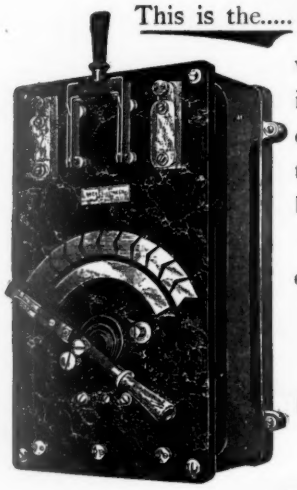

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